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WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

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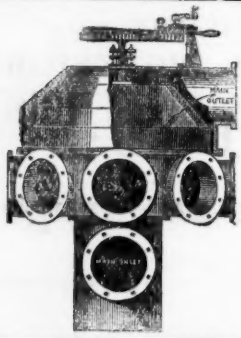
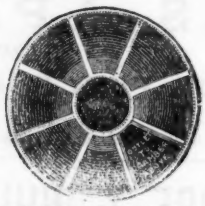
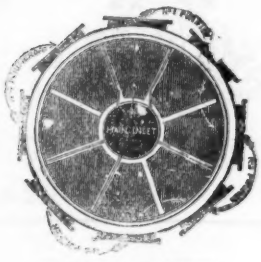


ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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And all kinds of Experimental Gas Apparatus.

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[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

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Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

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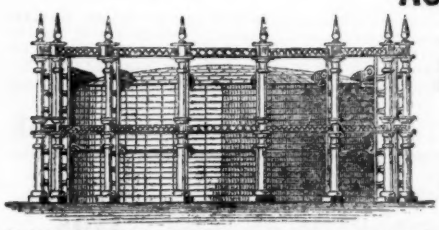

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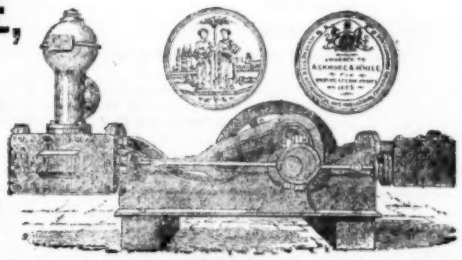

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No possibility of Valves sticking, as they are actuated by positive motion from an eccentric.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS. MEDIÆVAL FITTINGS for CHURCHES, &c.

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WEST'S GAS IMPROVEMENT COMPANY.
LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

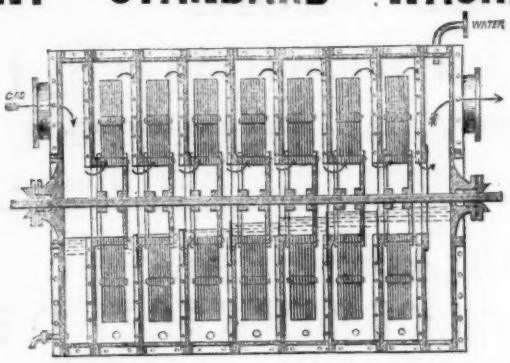
The advantages attending its use are—

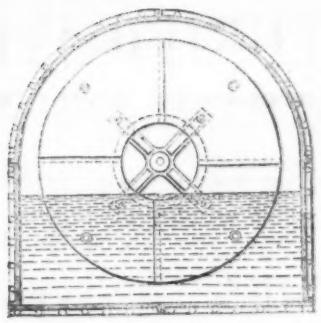
INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER COMPANY





These Machines contain from 3200 feet to 65,000 feet of Wetted Surface.

The Special Merits of this Washer are as follows:—That it is not necessary to reduce the temperature of the gas to 60°, or thereabouts, to make it effective; **and that as no tar is retained in it, the illuminating power is not reduced as in Tower Scrubbers.** That the distribution of the liquor is made with unerring regularity. That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather. That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided. That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas as it ascends. That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured. That it is much cheaper than any other Scrubber that will do the same amount of work effectually. That it is the only Washer suitable for purifying Gas from all its impurities by solution. That it works with a minimum of pressure. That it takes out every trace of Ammonia from the Gas in once traversing the machine, as well as a very large quantity of carbonic acid and sulphuretted hydrogen. That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

Messrs. Kirkham and Hersey. *The Gaslight and Coke Company, Beckton, North Woolwich, June* 8, 1880.

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor and the second with water. Of course the fact of our having ordered two more, in addition to the four which we have in use, is a sufficient indication of my opinion of the value of the Washer.

(Signed) G. C. TREWBY.

Messrs. Kirkham and Hersey. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June* 19, 1880.

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, faithfully yours, (Signed) CORBET WOODALL.

Messrs. Kirkham, Hulett, and Chandler. *The Gaslight and Coke Company, York Road, King's Cross, Jan.* 14, 1879.

Gentlemen,—In reply to your inquiry, I am pleased to say the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia,** while purifying more Gas than it was intended to do. I enclose particulars of a week's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.—I remain, &c., (Signed) JOHN CLARK, Engineer.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 *feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—*

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 7	11	9	7	5½	3½	3	1⅞	1½	¼	0	10 Gallons.	59,000	Nil.	74°	66°	31°	25	23½	5
,, 8	9½	7½	6	4½	3	2	1	¼	¼	0	10 ,,	73,000	Nil.	73°	61°	31°	28	26½	4½
,, 9	11	9	7	5	3⅜	2½	1½	1	¼	0	10 ,,	82,000	Nil.	74°	67°	33°	27½	25½	5
,, 10	10½	8½	6¾	5	3½	2½	1½	1	¼	0	10 ,,	66,000	Nil.	76°	64°	28°	28½	27	5
,, 11	12½	10	7¾	5¾	4¼	3¼	1⅞	1¼	¼	0	10 ,,	61,000	Nil.	78°	64°	27°	26½	25½	5
,, 12	11	8¾	6¾	—	—	—	1¼	½	¼	0	10 ,,	39,000	Nil.	74°	64°	27°	26¼	25½	5
,, 13	13	10¾	8¼	6	4¼	3¼	2	1¼	¼	0	10 ,,	78,000	Nil.	73°	65°	42°	28	26	5

Messrs. Kirkham, Hulett, and Chandler. *Corporation of Birmingham, Gas Department, Saltley Works, May* 23, 1879.

Gentlemen,—I beg to enclose you a copy of the results of the tests which, by the kind permission of the Engineer, Mr. Clark, I made on the 6th of March last, of the working of one of your "Standard" Washers and Scrubbers at the St. Pancras Station of The Gaslight and Coke Company, and I am of opinion that, for an apparatus occupying so small a space, they are exceedingly satisfactory.—Yours truly, HENRY HACK, Engineer.

Working Results obtained from Kirkham, Hulett, *and* Chandler's *Patent "Standard" Washer and Scrubber at the St. Pancras Station of The Gaslight and Coke Company, London, March* 6, 1879.

Gas passing per Hour, Cubic Feet.	—	Impurities in Gas per 100 Cubic Feet.			Temperature.		Pressure in Inches.	Revolution of Apparatus per Minute.	—	No. of Divisions and Strength of Liquor.										Water Used during Experiment. Gallons.
		SH_2	CO_2.	Grains. NH_3.	Washer.	Air.				10	9	8	7	6	5	4	3	2	1	
64,000 {	Inlet	2·00	2·00	158·8	72	57	21	4½	Twaddel deg. at 60°	5·3	4·9	2·85	2·35	1·7	1·05	0·6	0·3	0·18	0·1	63
	Outlet	1·50	1·50	0·8	68	57	20		Acid, ounces.	11·0	8·4	6·3	4·5	2·7	1·7	1·3	0·7	0·3	—	

Messrs. Kirkham and Hersey. *The Leeds Corporation Gas-Works, Meadow Lane, Aug.* 14, 1879.

Gentlemen,—In reply to your inquiry of yesterday's date, I have pleasure in stating that the item appearing as income derivable from Ammonia in my estimate of revenue for current year is not an exaggeration. Our average income from Ammonia is 2s. 8d. per ton of coals carbonized, but at the works where your invention is in use we derive not less than 3s. per ton. Since the introduction of efficient Scrubbers at our works the greater yield of this product (now twice as valuable as coke to us) is such that the cost of Apparatus for its extraction can be wholly paid for out of from nine to twelve months gains.

I am, Gentlemen, yours faithfully, (Signed) H. WOODALL, Engineer.

Messrs. Kirkham and Hersey. *Heywood Local Board Gas-Works, Hooley Bridge, Heywood, Dec.* 1, 1879.

Gentlemen,—In reply to your favour of the 28th ult., I beg to state that the Scrubber is at work, and doing well. I shall be glad to show it to any inquirers.—Yours truly,

(Signed) EDWIN BUCKLEY, Engineer.

For further particulars and testimonials, address Messrs.

KIRKHAM, HULETT, & CHANDLER, Limited, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

C. & W. WALKER'S
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Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
RECOMMENDED BY DR. RICHARDSON.

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BRADFORD, YORKSHIRE.

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ANVILS, VICES,
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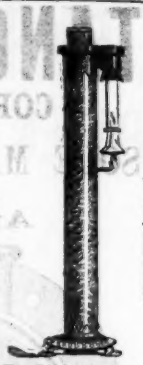
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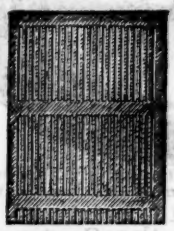
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SCRUBBERS FILLED WITH BOARDS,
On our approved principle, for the extraction of Ammonia.
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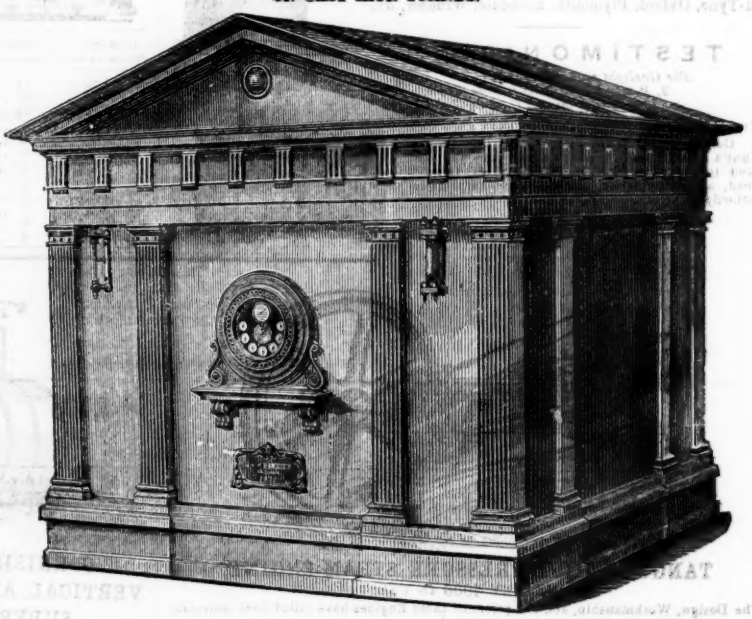

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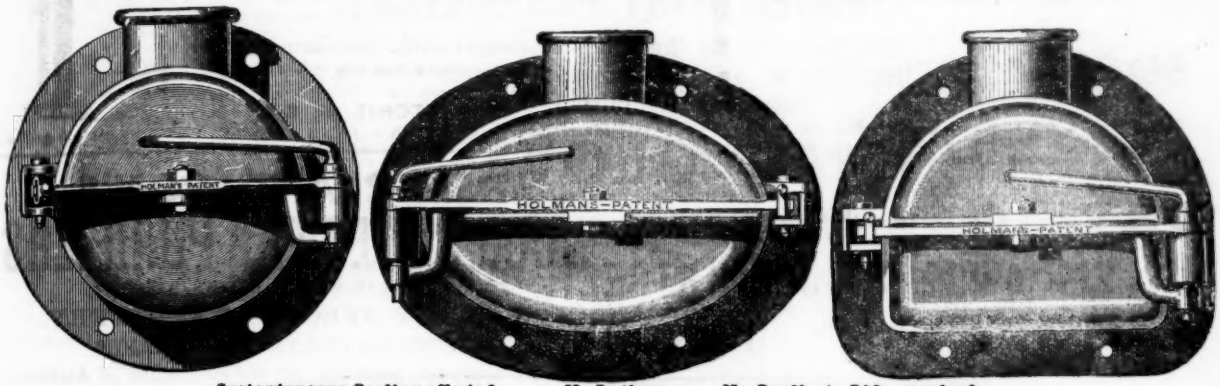
SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and Self-Sustaining Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Morton's Patent Retort-Lids are in use in nearly all the Principal Gas-Works in the United Kingdom and the Colonies; also on the Continent and in the United States of America. They are now made of the

SAME FORM OR SECTION AS THE RETORT. (See Illustrations above.)

Engineers preparing Specifications of New Works will be furnished with Dimensions of Stock Patterns, together with Approximate Weight and other data on application.

HUNT'S

EQUILIBRIUM DIRECT-MAIN GAS GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight & Coke Co. (19), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Leicester, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

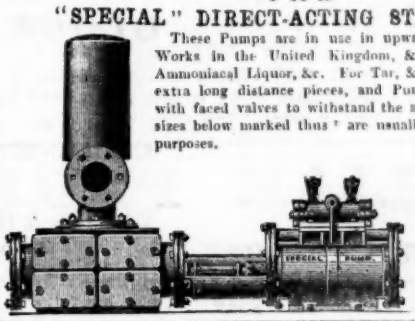
MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

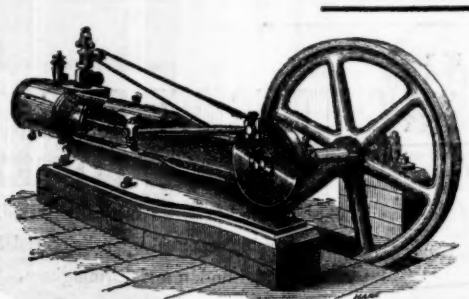
THE "SPECIAL" DIRECT-ACTING STEAM-PUMP.

These Pumps are in use in upwards of one hundred Gas-Works in the United Kingdom, &c., pumping Water, Tar, Ammoniacal Liquor, &c. For Tar, &c., they are provided with extra long distance pieces, and Pumps are entirely of iron, with faced valves to withstand the action of the liquid. The sizes below marked thus * are usually kept in stock for these purposes.



The quantities delivered of Tar should be taken about two-thirds that of water.

Diameter of Steam Cylndr.	Diameter of Water Cylndr.	Length of Stroke.	Gals. of Water per Hour, Approx.	Prices for Water.	Prices for Tar and Ammoniacal Liqr.
*3 in.	1¼ in.	9 in.	450	£16 0 0	£17 0 0
*4 ,,	2 ,,	9 ,,	815	18 0 0	19 0 0
*5 ,,	2¾ ,,	12 ,,	1,250	21 0 0	22 10 0
*5 ,,	3 ,,	12 ,,	1,830	22 10 0	24 0 0
*6 ,,	3 ,,	12 ,,	1,830	25 0 0	26 10 0
*6 ,,	4 ,,	12 ,,	3,250	30 0 0	31 10 0
6 ,,	5 ,,	12 ,,	5,070	35 0 0	36 10 0
*7 ,,	5 ,,	12 ,,	5,070	40 0 0	41 10 0
7 ,,	6 ,,	12 ,,	7,330	45 0 0	46 10 0
*8 ,,	6 ,,	12 ,,	7,330	50 0 0	52 0 0
10 ,,	6 ,,	12 ,,	7,330	60 0 0	62 10 0
10 ,,	8 ,,	12 ,,	13,000	75 0 0	77 10 0



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NEARLY 4000 IN USE.

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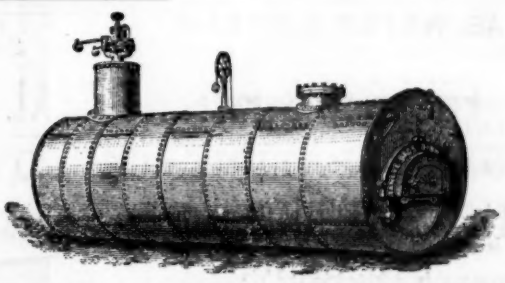
Nom. H.P.	2	3	4	6	8	10	12	14	20	25
	£28	£37	£44	£68	£86	£111	£122	£133	£185	£215

Including Governor and Feed Pump. Variable Expansion extra.



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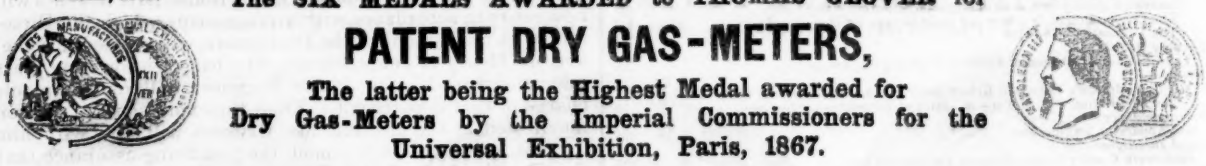
This Department having been greatly extended and furnished with the most approved Boiler-making Machinery and Tools, T. B. & H. are prepared to supply all kinds of Steam-Boilers with great facility at lowest current prices.

Also Makers of IMPROVED HYDRAULIC HOISTS, TRAVELLERS, CRABS, CRANES, PULLEY BLOCKS, HYDRAULIC AND SCREW LIFTING JACKS, LATHES, PUNCHING AND SHEARING MACHINES, And all other Descriptions of Tools, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, &c., ON APPLICATION.

London, 1851. New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865. Paris 1867.



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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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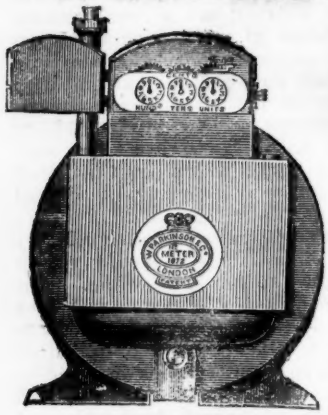
THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.



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SOLE AGENTS FOR

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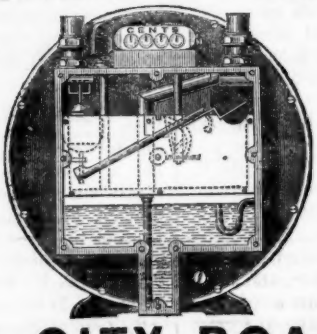
HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

CONTENTS.

	PAGE
Circular to Gas Companies:—	
The Meeting of the Commercial Gas Company	525
The Meeting of the Alliance and Dublin Consumers Gas Company	525
The Meeting of the Sheffield United Gas Company	525
Gas Affairs in the Antipodes	526
The Liability of Incoming Tenants for Arrears of Gas-Rent	526
Meeting of the North of England Gas Managers Association at Sunderland	526
Opening of the Glasgow Exhibition of Artificial Lighting Apparatus	526
The Winter Instructions of the Metropolitan Gas Referees	527
Water and Sanitary Notes:—	
Danger of Supplying Water to the Metropolis by an Aqueduct	527
The Wells of Exeter and the City Water Supply	527
Increased Rating by the Edinburgh and District Water Trust	527
The Corporation of Windsor and their Sewage Farm	527
The Ventilation of Sewers	527
Leading Article:—	
The Glasgow Exhibition of Artificial Lighting Apparatus	528
Notes:—	
Mr. G. Anderson's Improved Retort Settings—A New Gas and Steam Engine—The Distillation of Coal Tar—A Result of Enterprise in the Colonies	529
Correspondence:—	
Gas Apparatus Exhibitions	530
Legal Intelligence:—	
Southwark County Court—Illegally Cutting Off Gas	530
Miscellaneous News:—	
Exhibition of Gas and Artificial Light Apparatus in Glasgow	530
Sale of Gas Shares at Wakefield	530
Meeting of the Commercial Gas Company	531
Tottenham and Edmonton Gaslight and Coke Company	533
Sewer Ventilation by Street Lamp-Pillars	533
Brisbane Gas Company	533
Meeting of the Alliance and Dublin Consumers Gas Company	533
The Public Lighting of Wymondham	534
Meeting of the Sheffield United Gas Company	534
Meeting of the Australian Gas Company, Sydney, New South Wales	535
Meeting of the Auckland (New Zealand) Gas Company	535
Rio de Janeiro Gas Company, Limited	536
The Gas Apparatus at the Manchester Industrial Exhibition	536
The Public Lighting of Sidmouth	536
The Distillation of Coal Tar	537
Sanitary Institute of Great Britain	537
A Novel Object of a Flower Show	539
The Salford New Sewage Works	539
Trade Notes from Scotland	539
Trade Reports	539
Sale of Shares in the Reading Gas Company	540
Bursting of a Water Tank at the Crystal Palace	540
Share List of Gas and Water Companies	540
Register of Patents:—	
Applications for Letters Patent	541
Patents which have passed the Great Seal	541
Patents which have become void	541

TO CORRESPONDENTS.

H. S. G.—*Address Major G. Warren Dresser, Editor, "American Gaslight Journal," 42, Pine Street, New York City.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 5, 1880.

Circular to Gas Companies.

THE half-yearly general meeting of the Commercial Gas Company was held on Friday last, when the Directors report and the statement of accounts, which will be found in another column, were presented and taken as read. The Chairman, Mr. R. Bradshaw, in the brief speech in which he sketched the history of the Company during the past half year, dwelt with excusable satisfaction on the handsome profit that had been made in that period, the steady progress which marks the Company's business, and the careful manner in which they have observed the requirements of the law respecting the purity and illuminating power of their gas. He pointed out the fact that the total receipts for gas were within a few pounds of what they were for the corresponding half of last year, in spite of a reduction of twopence per thousand cubic feet which has since come into operation. In connection with the recommendation to the meeting to declare dividends after the rate of eleven and a quarter and eight and a quarter per cent. on the new and old stocks respectively, which, it is unnecessary to add, were accepted unanimously, the Chairman made the gratifying announcement that the Directors had decided to reduce the price of gas to 3s. per thousand cubic feet, as from the 1st of January next. This is just as it should be. The Directors might well have divided another quarter per cent. on their stock, but instead of doing so they have carried forward a good round sum, which will help to assure the Proprietors of the continuation of their present dividends, in view of the recent issue of £60,000 of new stock, bearing interest from the commencement of the current half year, and also of the promised reduction in price. But the Chairman was not content to promise that the present rates of dividend should be maintained; he went farther, and held out hopes that by this time next year the stock of the Commercial Gas Company would be paying twelve and nine per cent. per annum. Such statements were a fitting prelude to the concluding portion of the Chairman's remarks, wherein he referred to the imminent retirement of Mr. Robert Jones, the Company's Senior Engineer, who has served them for twenty-six years, and in that time has seen his employers income quintupled and their dividends doubled. With this success Mr. Jones's name is linked, and it is only justice to that gentleman to say that he has kept the works and plant of the Company fully up to their increasing requirements and to the standard of the times. Mr. R. Jones will now retire in accordance with arrangements which the Directors, with the consent of the Proprietors, will proceed to make; and Mr. Henry E. Jones, his son, who has been for some years associated with him as Junior Engineer, will remain in sole charge of that department. From the expressions of opinion manifested at the meeting, Mr. R. Jones will take with him into his honourable retirement the gratifying assurance that the Shareholders of the Company with which he has been connected so long, and has helped to place in such a sound condition, have fully appreciated the value of his services. The Company are decidedly flourishing and strong, and if, as the Chairman anticipates, the Directors are able next year to pay the high dividends already mentioned, we may be sure, from the careful manner in which they have strengthened the Company's financial position during the past year, that they will be careful to still preserve a sufficient margin, and will not weaken their available resources merely to pay sensational dividends.

The Alliance and Dublin Consumers Gas Company have just held their half-yearly meeting, when a dividend after the rate of ten per cent. per annum was declared, leaving the sum of £5152 to be carried forward. The Chairman, Mr. E. Fottrell, had to mention in his speech the somewhat curious fact that the gas-rentals for the past half year are less by £2248 than for the corresponding period of 1879—a decrease which he was somewhat at a loss to account for, except on the ground that the weather during the half year had been brighter, or that the consumers were getting economical. The latter reason appears to be the more credible, especially as the Dublin people have, according to the Chairman, been continually blamed for wasting gas and afterwards grumbling at the amount of their gas bills. In spite of the decrease in the rentals and the diminished revenue from residuals consequent on a lessened consumption of coal, the profit on the half year's working has been £3300 more than was realized in the corresponding half of 1879, owing to cheapness of coal and economy in manufacture. The Directors are hopeful of good results in increased consumption of gas, without waste, from the recent exhibition of gas-cooking stoves and apparatus held under their auspices. The Company are beginning in a somewhat small way, perhaps, but still with much promise, to avail themselves of their powers to sell and let on hire gas stoves and fittings, so that with the efforts they are making to extend a knowledge of their staple commodity, and also to cheapen it, it may be expected that they will next have to record an increase in their business, instead of the opposite as at present.

The Sheffield United Gas Company also held their ordinary half-yearly meeting last week, but there was other matter besides mutual congratulations to be dealt with by the Chairman in his opening remarks. To begin with, the reserve-fund has been drawn upon to the extent of £2685, to make up the sum necessary for the payment of full dividends, and this somewhat disappointing circumstance had to be explained by the recital of a dismal series of troubles and losses which the Company have experienced during the last six months. Their gas is very cheap, having recently been reduced threepence per thousand feet, until the price now stands at 2s. to 2s. 4d. The consumption of gas has increased, apparently to the Directors satisfaction, but the threepence was a heavy drop to be compensated for. Then their expenditure on retort repairs has been £4388 more than during the corresponding period of last year, and a coke shed fell down, causing a loss of £1288. A sewer had also to be reconstructed at a cost of £745, and over £300 went in altering scrubbers. Local rates were £874 heavier than before. It is therefore not to be wondered at that even an elastic revenue failed of being proof against such a number of exceptional assaults. But there is no cause for alarm in all this; the reserve-fund is intended to meet such emergencies, and it might be said with equal truth that in the present instance it has been drawn upon, say to equalize the charge for retort repairs, as for making up a dividend. If reserve-funds were never required they would never be formed. It is hardly to be expected that another six months will have so many unpleasant surprises in store for the Company as the past half year, and by the end of December it

may be taken for granted that the gas-rentals will have reached their normal proportion. It would be most unfortunate if a Gas Company selling at such a low price were to be discredited, while a Corporation can succeed in keeping down to the narrowest possible margin. There is no difference between the two organizations to prevent one doing as well as the other, and we shall therefore rejoice when the Sheffield Company are on an even keel again.

The two colonial Gas Companies—Australian and New Zealand—whose reports we publish elsewhere, are both examples of successful enterprise and rapid development of civilized appliances in new countries. The Australian Gas Company, whose works are at Sydney, took their name when the general title was of more local application than it is at present, when there are in Australia other Gas Companies than the metropolitan one. The profits of the Company for the half year ending last "winter"—June 30th—amount, with the balance carried forward, to £24,351, and a dividend of seven and a half per cent. for the six months was declared at the last meeting. The Company have been compelled, by the increase of their business, to purchase additional land and erect new works. The Auckland (New Zealand) Company is a more modern concern than its Australian neighbour; but it is rapidly growing, and stands exceedingly well as regards financial position. The advantages of gas are fully appreciated in the Antipodes, and the dividend paid on flourishing gas stocks are such as to make the early promoters of gas undertakings congratulate themselves on their far-sightedness in so investing their money at times when many more dazzling investments were seeking to attract capital.

The case of *West v. The Phœnix Gaslight and Coke Company*, of which we give a report in another column, is one of those instances of apparently arbitrary proceedings on the part of a Gas Company against a defaulting consumer's successor in premises supplied with gas. These cases are now as rare as they were at one time common. The plaintiff in the present suit moved into a public-house, the previous tenant of which had become bankrupt and left his gas account unpaid—the broker being, in fact, on the premises at the time—and on the day following the plaintiff's entry he received notice from the Gas Company's collector, to the effect that unless the outstanding account was paid, the gas would be cut off, which was, in fact, done later in the day. In order to get a supply for the evening, the plaintiff paid, under protest, what was due, and afterwards brought the present action to recover the amount so extorted, as he contended, by illegal pressure. A verdict was eventually found for the plaintiff for the amount claimed, with costs, in pursuance of clause 39 of the Gas-Works Clauses Act, 1871, which expressly states that an incoming tenant is not to be held liable for arrears of gas left unpaid by a former tenant, except there is an agreement between them by which the former undertakes to pay such arrears. In this case the plaintiff denied the existence of any such agreement; but as he appears to have consumed the Company's gas for at least one night before it was cut off, and there is no record of his having made any application for a supply of gas on his own account until he was compelled to do so, the Company's officials were not so much to blame for having suspected "collusion" between the new and former tenants, especially as they may have had clause 39 of the Metropolis Gas Act, 1860, in their minds, wherein this word is mentioned. The term is, however, so vague, and it is so difficult to determine what possible collusion, taken as meaning a conspiracy, there could be in such cases, that the more definite language of the later Act is decidedly preferable; and as the 1871 Act must be held to be explanatory of the Act of 1860, no other issue of the case in point was possible; and it is therefore unfortunate, the grounds of the Judge's decision being so plain, that the Company's officials should have been so misled as to have taken the high stand they did, without satisfying themselves that they were within the strict letter of the law in so doing.

The North of England Gas Managers Association had a very successful and pleasant gathering last Saturday, under the presidency of Mr. J. H. Cox, the handsome board-room of the Sunderland Gas Company being used for the business part of the meeting. Mr. Cox in his opening address referred to some of the early attempts at gas lighting in Sunderland, and to the advantages of assemblies of professional men such as those resulting from the various Associations of Gas Managers. The recent catastrophe at the Seaham Colliery, which is in the immediate neighbourhood of Sunderland, was afterwards brought under the attention of the meeting, and a proposition was carried to contribute a sum of ten pounds from the funds of the Association towards the relief of the distress resulting from the accident. Papers were then read by Mr. J. T. Jolliffe and Mr. W. J. Warner; the former on "The Utilization of "the Waste Heat from the Retort Flues for the Generation of "Steam;" while the latter was entitled "Some Notes on the "Work of Purification." Both papers were well discussed. After the meeting the Chairman of the Sunderland Gas Company (Mr. W. Robson) invited those present to luncheon at the Hendon Gas-Works, and to an inspection of the extensions there carried out by Mr. Hawksley. Many of the members, on arriving at the works, expressed considerable surprise at the very picturesque entrance—the Manager's house being there, a villa surrounded by shrubs and flowers and having an extensive lawn and cricket-ground attached. A visit to these works could not fail to remove many prejudices that might be entertained as to the insalubrity of such places. Mr. Robson, who presided at the luncheon, was, as usual, most happy in the remarks with which he proposed some of the principal toasts given at the conclusion of the proceedings. We shall in future issues give a report of the whole meeting.

The Glasgow exhibition of apparatus and materials used for the purposes of lighting and heating was opened by the Lord Provost, in presence of a numerous company, on Tuesday last, and bids fair to be a great success. Exhibitors have come forward with commendable alacrity in response to the invitation of the Executive Committee, and the exhibition is without doubt the most important of its kind that has yet been held in any part of the United Kingdom. As might have been expected, the popular character of the show has had some influence in determining the relative proportions of the classes of exhibits, those articles which appeal to the general public being shown in greater numbers and variety than the manufacturing appliances which are of more direct interest to members of the profession of gas engineering, though, on the other hand, most of the water-fittings are of a decidedly technical character. As a more detailed account of some of the exhibits will be found in another column, we need not more particularly refer to them here. We must, however, congratulate the Executive Committee, as well as the original promoters and patrons of the project, among whom the Philosophical Society and the Corporation of Glasgow stand first, on the success which has so far attended their efforts, and which we may hope will be added to in other ways while the exhibition remains open, and after it has closed. Without wishing to import any controversial element into this expression of our satisfaction at the results that have been achieved, we cannot help noticing, in connection with a matter that has already engaged our attention in reference to the conduct of these exhibitions of gas apparatus, the testimony which is afforded at Glasgow of the complete, and it is to be hoped final collapse of certain influences tending to the restriction of the value of these competitions as tests of manufacturing progress in at least one highly important direction. Of this we will say no more at present, trusting that such an unpleasant matter may soon be forgotten, except for the warning which it has afforded. The present exhibition may be said to have demonstrated the possibility of giving an importance to the periodical assembling of those classes of appliances embraced by it, which we trust will not be lost sight of by those who are primarily interested in the progress of the manufacturing industries involved. We see no reason why an exhibition of sufficient note to attract universal attention should not become an annual event, to be held in different large towns where facilities exist for making it commercially successful as well as of real scientific interest. A guarantee-fund and the necessary central organization might be formed without any great difficulty, and the British Association of Gas Managers might be very properly interested in an effort which could be made productive of much good in many ways. The yearly progress of invention might thus be plainly demonstrated, and meritorious improvements in apparatus for the manufacture and utilization of gas would secure more conspicuous notice than when brought at hap-hazard before the public as at present. We believe, in short, that the time has come when the proceedings of the associations which have done so much to forward the science of agriculture and the allied arts, might be successfully copied by the friends of that highly important and far-reaching branch of modern industry which is concerned with providing artificial illumination for the teeming urban population of this country, and that a powerful Association with such an object would be of service not merely to the individual interests comprised within its range, but also to the community at large.

The Winter Instructions of the Metropolitan Gas Referees have been issued, and state the amount of impurity to be permitted in the gas supplied from the works of the Metropolitan Gas Companies. The maximum amount of ammonia allowed is 4 grains per 100 cubic feet. In the gas made at Beckton, Bow, and Bromley the maximum amount of sulphur allowable will be 20 grains per 100 cubic feet, and in the gas made at the other stations of The Gaslight and Coke Company and at the works of the South Metropolitan Gas Company and of the Commercial Gas Company, it is fixed at 25 grains. The Referees give notice that after the present winter the distinction made hitherto in favour of urban works will cease, so that we may in future expect to see all the gas used in the Metropolis tested under equal conditions. These being the first Instructions issued by the Referees since the passing of The Gaslight and Coke and other Companies Amendment Act, 1880, notice is given that the Referees will shortly issue further Instructions relative to the mode of testing for pressure in accordance with the provisions of that Act. Additional testing-stations will also be prescribed for the districts recently acquired by the South Metropolitan Company.

Water and Sanitary Notes.

The idea so acceptable to Sir William Harcourt and others, that London should be supplied with water by means of a huge aqueduct bringing a supply from a distance, receives a timely correction by the report which has lately arrived from New York. We are told "it is felt that, should any accident "happen to the Croton Aqueduct, very serious consequences "would ensue." It is therefore proposed to build a new conduit, which will serve the twofold purpose of increasing the quantity of water furnished to the city, and of lessening the risk that the supply will be entirely cut off. That much benefit would accrue from the unification of the eight water undertakings of the Metropolis, is a point which can scarcely be disputed; but it is another matter to make everything hang on one thread, and render the supply of an immense city dependent on the integrity of a single line of communication. The distribution of the sources of supply is in itself an advantage, as any break-down would be but partial—a matter of great moment both in reference to the ordinary wants of the population and the incident of a large fire. If military considerations are to have any weight, nothing could appear more imprudent than to concentrate the water supply of London into one great aqueduct. If the idea of war within the limits of Great Britain be deemed altogether visionary, we have yet to consider the wild and diabolical freaks possible to Fenianism and other political combinations or conspiracies. In these days of dynamite and Thomas machines, society is liable to be shocked by deeds which are even worse than those of war. Dismissing all these possibilities from the argument, we have yet to consider the likelihood of accident occurring. If New York feels it necessary to be cautious on this point, assuredly there is every reason why London ought to be on its guard.

The extreme improbability of finding a pure and adequate supply of water for the people of Exeter by sinking wells in the vicinity of that city, has just been shown by Mr. Thomas Andrew, in a paper read before the recent Sanitary Congress. Between two and three years ago, the Corporation of Exeter purchased the water-works from the Company to whom they belonged, and since then there has been an agitation for superseding the Exe water by means of deep wells. Nearly all the existing wells are found to be seriously polluted, and Mr. Andrew explained that the geological features of Exeter and its vicinity were such as to discourage the idea of seeking a supply of water from subterranean sources. A boring 300 feet deep had only yielded very little more than was wanted for the purposes of the brewery with which it was connected. Exeter has in its very centre an extinct volcano, which in its days of activity so disturbed the adjacent strata that they are too much inclined to favour the collection of underground water. Even Mr. Rawlinson was obliged to own that the case was desperate, though he thought there must be places not very far distant where a good supply could be obtained if the river was not satisfactory. He recommended the Town Council, before expending any money on well-sinking, to read the Sixth Report of the Rivers Pollution Commission. The Mayor of Exeter considered it was very fortunate for the citizens that the discussion had been raised. He had arrived at the conclusion that the Exonians should now set to work and call upon the towns on the banks of the Exe to stop the flow of sewage into the river. A paper bearing on the same question was subsequently read by Mr. Frank P. Perkins, the Public Analyst for the city of Exeter, wherein the generally unwholesome quality of the well water was set forth by numerous examples. The river appears to be the only source, unless the city is prepared to meet the expense of seeking a supply from a distant locality.

Edinburgh has received the benefit of a Water Trust in the place of the Water Company which formerly existed. The citizens were promised cheaper and better water under the new system, but complaint is made that the supply now given is both dear and bad. The water-rates are rising, and there is the prospect of a further outlay of £50,000 on the capital account. This expenditure is for the purpose of carrying out a scheme which it is said will make the supply no better in quality, but rather worse, as the source to be drawn upon only yields water of a "wretched character" and "undeniably unwholesome." The cost of the new works is said to have amounted already to £480,000, which is far in excess of the estimated cost when the scheme was submitted to the ratepayers. Discontent is thus rife in "Auld "Reekie," and the only consolation we can suggest is that the sufferers have the honour of furnishing a useful example for the consideration of the inhabitants of the great Metropolis.

The Corporation of Windsor, as the Urban Sanitary Authority of the Royal Borough, have just found themselves in the anomalous position of being fined for polluting the Thames. The Conservators of the River were the prosecutors, and so far did their duty in seeking to protect the stream. But the work was done in rather a bungling way, the sample of effluent water on which the prosecution was founded being taken after a fashion which would scarcely have satisfied some tribunals. The process of purification employed by the Windsor Corporation in their treatment of the town sewage, is that invented and patented by Mr. Hille; but it was stated in evidence that the works were not yet complete. Another fortnight, it was alleged, would see everything finished, and the cost of the works constructed for the purpose of complying with the demands of the Conservators was £42,000. Still, it was sufficiently clear that on the evening of a certain day in June last a polluting liquid was flowing into the Thames from the outfall of the Windsor sewage works. Consequently, a small fine was inflicted—namely, £5. The costs incurred by the Conservators were stated at ten guineas, and the bench of Berkshire Magistrates, before whom the proceedings, as reported in last week's JOURNAL, took place, ordered the Windsor Corporation to pay one-half. It is to be hoped that this will be the last occasion on which it will be necessary to prosecute the Windsor authorities for polluting the Thames. They have enjoyed a long day of grace, the original notice from the Conservators having been served upon them as far back as thirteen years ago. It is satisfactory to learn that analyses of the effluent water, taken both before and after the legal proceedings, have not shown anything amiss.

The ventilation of sewers is a troublesome and disquieting topic. But the subject is one which must be fully considered and practically dealt with, or the poisonous gases will do their deadly work. It is evident that some towns—and we fear there may be many—which have carefully provided for the removal of the liquid sewage, have to a great extent shirked the question of the gaseous matter. A suggestion has been revived for ventilating the sewers up the shafts of the street lamp-posts. But here there is the double danger of poisoning the lamp-cleaners, and of pouring volumes of sewer gas into the windows of the houses. Ventilating gratings in the middle of the street could scarcely do more harm than the lamp-posts charged with sewer gas. When the gas is burning there might be a peculiar advantage in the lamp-post system, but that would only be for a portion of the twenty-four hours. A Winchester brewer has dealt with the question, so far as his own premises are concerned, by leading the gases into his brewery chimney, up which they take their course, thereby relieving his cellars from the inrush of sewer gas which formerly made them offensive. On the same principle it is urged that houses should have ventilating pipes connected with the drains and water-closets, and leading up to a higher level than the windows. A bye-law to enforce such an arrangement is said to exist in Winchester, and is considered to answer well.

THE Gas Committee of the Manchester Corporation are enabled, out of the profits realized during the year ending the 24th of June last, to hand over a sum of £52,000 to the Improvement Committee for the purposes of city improvements. A reduction in the price charged of 2d. per 1000 cubic feet is to be recommended to the Council.

THE GLASGOW EXHIBITION OF ARTIFICIAL LIGHTING APPARATUS.

FIRST NOTICE.

The exhibition of apparatus connected with artificial lighting, now open in Glasgow, is a completely successful attempt to show in close contiguity the principal substances and appliances in common use for the purposes of illumination. A fair field has been preserved for all kinds of lighting media, and the fact that coal gas, in its primary and subsidiary applications, forms the most prominent of the several groups of exhibits, although only what was expected and hoped for, must still be accepted as the result of the commanding importance of gas lighting, and is not due to its having been specially favoured by the Committee entrusted with the organization of the exhibition.

The initiative of the show was taken, as our readers are doubtless aware, by the Philosophical Society, and the idea was warmly seconded by the City Authorities, who agreed to give the gas and water required, and also consented to the appropriation of the surplus funds of an industrial exhibition held in 1845, to form a guarantee-fund for the proposed display. The project having thus taken form and substance, a site was chosen, and the Executive Committee were fortunate in finding, in the Burnbank Drill Hall and grounds, a building spacious enough to contain by far the greater portion of the exhibits, and also ample facilities for the erection of a temporary lecture-room and the indispensable annexes. The exhibition buildings stand over a hundred yards back from the Great Western Road, and the approach is lighted up at night with several of Wigham's and Sugg's powerful lamps. Beside the pay-stall is a wooden structure, from which one of Wigham's patent burners, with a complete first order dioptric fixed-light apparatus, is intended to be exhibited with the varying fog powers of burner as in lighthouses. Just within the turnstiles, to the left of the entrance, one of Pintsch's patent gas-lighted buoys floating in a tank, with its light shining day and night, is a conspicuous object.

In the principal building an attempt has been made to take advantage of the equal division of the hall along its length by the double span roof, and to have one half lighted by gas, and the other, nearer the entrance, by the electric light, all windows and other openings by which daylight might enter being darkened, in order to keep the exhibition always lighted by artificial means. Unfortunately for the complete success of this intended competition, the electric light was not in proper order on the opening day. It was in action at Messrs. Strode's stand for a short time, but eventually broke down, and the gas was left in sole possession. It is needless to say that the gas-lighted half of the hall, provided as it was with several of Sugg's, Wigham's, and Bray's powerful lamps, was very brilliantly illuminated, the celebrated 28-candle Glasgow gas showing to great advantage in the various splendid burners in action, and giving light, measurable by hundreds of candles, in any part of the portion of the building referred to. It was noticeable that no one complained of the brilliant illumination as at all trying to the eyes, the steadiness with which it was maintained relieving the muscles of the iris of much of the strain always resulting from flickering lights, whether electric or otherwise. But if the light was not oppressive, the heat from the many stoves and burners was most decidedly so, the ventilation of the building being wofully defective. For this the Committee are not entirely to blame, as they had made arrangements for working two ventilating fans, by Schiele and Pelzer respectively, by which the air of the hall was to have been changed every eight minutes; but neither of these machines could be got ready in time, and the result was very unfortunate, giving ground for the complaint of perspiring visitors that some other means of ventilation should have been made available. Before these remarks are printed, however, it is probable that this inconvenience will have ceased to exist, so that intending visitors need not absent themselves from the show for fear of being asphyxiated.

The forward state of the exhibition at the time fixed for the opening was very creditable, both to the Committee and to the Exhibitors. Very few stalls, comparatively speaking, were bare of their proper furnishing at two o'clock on Tuesday last, when the unpretentious opening ceremony, particulars of which will be found in another column, was performed by the Lord Provost; and to describe the appearance of the show at that time in general terms, before entering into particulars, it may be said to have presented a complete, bustling, and business-like aspect, most gratifying to those who promoted the undertaking, and were present to see their most sanguine anticipations as to the varied and comprehensive character of the exhibits fully realized. The stands, 172 in number, comprising thousands of articles, were ranged round the Drill Hall and in lines down its length, while some exhibitors had to take refuge in the annexe, and outside the building. The official catalogue was very accurately compiled, and the classes of exhibits were arranged with as much regard to proper sequence as could be secured.

Immediately opposite the entrance is to be found Mr. James Keith's large stand, a special feature of which is an ornamental column and fountain, surmounted by a coronet of gas-lamps which light up the splashing water with striking effect. Some large boilers for gas heating are shown by Mr. Keith, and also a "Rider" hot air engine worked by gas. Passing onwards, we take the catalogue for our guide, and find that the honour of being first on the list belongs to Mr. James Binnie, of Gartcosh, who exhibits a good collection of fire-clay retorts and bricks. Then we come to a series of samples of Scotch coals and cannels, the contemplation of which can scarcely be considered exciting; we may note, however, a good piece of fossil in cannel, consisting of a section of a tree of about 15 inches diameter, from the Boghead colliery, Torbanehill. The Scotch colliery owners and agents have not all their own way, for samples of English, American, and even Australian coals are on view, —more, of course, as curiosities than with any serious intention of fighting the Scotch minerals on their own ground. Mr. James Dunnachie, of Glenboig, shows some well-made fire-clay goods, among them a brick-built retort on Mr. Hislop's plan. For some reason none of the English makers of fire-clay goods are represented in this exhibition, and this is rather to be regretted. Mr. David Corse Glen has a very handsome case of specimens of coals, shales, and hydrocarbons, commencing with the precious crystallized perfection of carbon known as the diamond. The coal-mining section is also supplied with many specimens of safety-lamps, and various kinds of fire-damp indicators. Conspicuous among these are some examples of Ansell's fire-damp or choke-damp and gas-leakage indicators, which, as already explained in our "Notes" column a few weeks since, act on the principle of the diffusion of gases. Mr. Wilson, of 123, St. Vincent Street, Glasgow, shows an apparatus consisting of a balanced balloon for the same purpose. Professor Forbes's "Damposcope" is also on view, and, in the hands of the attendant, indicated the presence in the atmosphere of the hall of one-half per cent. of gaseous vapour, presumably from the liquid hydrocarbons unavoidably spilled and wasted from the various lamps, gas machines, &c. This ingenious instrument depends on the difference in tone given by a tuning-fork in atmospheres of varying density. A curious little arrangement for indicating the presence of gas in the holds of vessels, or in mines, or, in fact, anywhere that can be reached with a pipe, was shown by Mr. W. Young, of Belfast, and consisted of a graduated glass tube, in which fumes of hydrochloric acid could be made to rise to a height proportional to the amount of gas in the atmosphere exposed to the acid, the necessary acid reservoir and aspirator being comprised in the apparatus.

Following the course of the manufacture of gas, having noticed the raw material and the construction of the retorts, we must now draw attention to Messrs. Laidlaw, Sons, and Caine's important exhibit of apparatus for use in gas-works, including a handsome steam-engine and exhausters intended for erection at the Salford Gas-Works. This stand, which is situated at one end of the hall, attracted much notice, and forms a fair epitome of the firm's special manufactures. We must not omit to mention also a pretty model of a complete small gas-works included in Messrs. Laidlaw's exhibits. There was no other show of engineering specially connected with the manufacture of gas of equal importance in the exhibition. Messrs. Macfarlane, Strang, and Co., Limited, of Glasgow, show specimens of cast-iron pipes, made with Macfarlane's patent sand core-bar, possessing great internal smoothness and regularity of section; the same firm also show several examples of Painter's patent hydrostatic joint. The North British Metal Company show specimens of Spence's metal in ingots, and also in pipe-joints and ornamental medallions, &c. A peculiar though somewhat complicated looking self-sealing retort mouthpiece and lid, fitted, is shown by Messrs. W. Grice and Co., of Birmingham, and there are several stands of wrought-iron pipes and fittings, and screwing tools, &c. Messrs. J. G. Williams and Co., of the Victoria Paint-Works, Manchester, have the only stand of specimens of paint suitable for gas-works and exposed ironwork generally; they show a handsome model of a pair of gas scrubbers, by Dempster, painted with their metallic oxide paint in various tints. Messrs. Owens and Co., of London, show a Blake's direct-acting steam-pump and some Mann and Owens gas-valves, finished in their usual style; and gas-valves and fittings are also shown by Messrs. Alley and Maclellan, of Polmadie, Glasgow.

Meters are well represented, Messrs. George Glover and Co., of London, being conspicuous with a stand of very beautiful specimens of workmanship, including a standard cubic foot bottle fitted up as a transferrer, and nickel plated. Messrs. Glover also show a 5-feet standard model gasholder, a *fac simile* of those deposited with the Board of Trade. The Imperial Meter Company, of St. Pancras, London, show one of their 10-light meters, and Messrs. D. Grant and Co., of Edinburgh, have a case of well-made pressure-gauges and fittings, and show some good meters. Messrs. Cowan, of Edinburgh, have a striking show of their widely-known manufactures in this department, and help to maintain the credit of the Northern meter manufacturers, as do Messrs. D. Bruce Peebles and Co., of Bonnington, Edinburgh, who show a goodly number of special articles of the class for which the firm are celebrated. Among other things, Messrs. Peebles show the reliance that may be placed on their street-lamp governors, by fitting a lamp-post with a clock, which gives the consumption of the burner by recording the hours during which it is in operation, instead of measuring the actual gas consumed, as in the ordinary working of the average system of street-lamp lighting. The change is an improvement in the direction of saving in apparatus and increasing the convenience of applying the system. A system of flash signalling by reflected gas-lights, included among the interesting objects contributed by Messrs. Peebles, attracted much attention.

Of regulators and governors of various kinds and sizes there is a plentiful supply, most of which, however, possess little claim for notice on the ground of novelty. Without including the governors fitted to burners, it may be said that ingenuity has apparently exhausted itself in the different shapes and surroundings with which the well-known principle of a gas governor has been dressed up, as manifested by examples shown in the present exhibition, some of which, such as that sent by Mr. Busch, claiming distinction as being the oldest as well as the best, and others advocated by reason of their novelty and consequent excellence; but none were deserving

of more than the general praise that can be well accorded to any really serviceable apparatus of this kind.

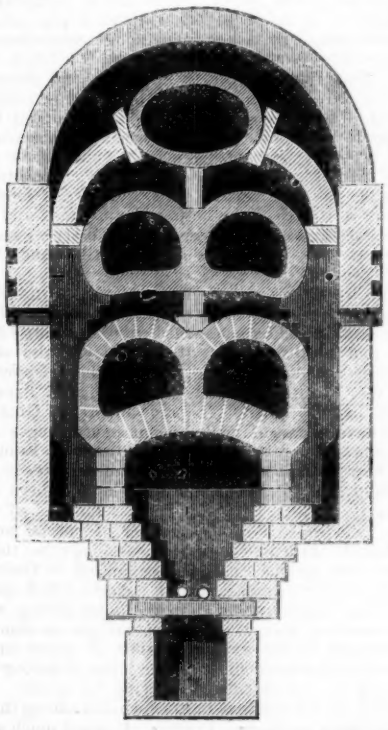
We may now pass on to notice the various exhibits of gas-burners and lamps, which form one of the most important classes into which the articles in the exhibition are divided. We have already referred to the powerful burners for intense illumination shown by Messrs. Sugg (through Mr. Nelson, of Gordon Street, Glasgow), Messrs. Edmundson (through Messrs. P. Watt and Son), and Messrs. Bray, of Leeds, concerning which it is only necessary to add that they were distributed where needed to give the daylight brightness which was maintained in the gas-lighted half of the building and outside it. Coming down to the humbler requirements of internal house lighting, there are many specimens of burners and lamps shown, in which the brilliancy of the light and the elegance of its "installation," as our French neighbours would put it, contend for admiration. Mr. Sugg's goods were most striking, and the stand at which they were exhibited was one of the largest in the hall, the well-known Argand and "Christiania" burners, and their accompanying fittings in use, making a brave display. One of Sugg's Letheby Photometers was also shown, as also Methven's gas-testing apparatus, and some of Sugg's new lamp governors. Not far from Mr. Nelson's stand was the business-like show of Messrs. Bray, of Leeds, the principal part of whose space was filled with specimens of their steatite burners, although they also had on view some elegant brackets, &c., fitted with their improved globes and burners in use. Beyond these were several exhibits of more or less ingeniously constructed burners and gas-lamps, the productions of Mr. Heron, of Manchester, and others of less importance.

Notes.

[This column is intended to contain miscellaneous memoranda on topics of general professional interest to our readers. We shall be glad to receive for insertion in it any scraps of information, observations of facts, or descriptions of apparatus, &c., which may be worth publication, and yet may not be considered suitable for our "Correspondence" column.]

Mr. G. Anderson's Improved Retort Settings.

The accompanying engraving is a representation of an improved system of retort-setting recently introduced by Mr. G. Anderson, and brought into use in the course of last month at the Kilkenny Gas-Works. The setting consists of one twin brick retort over the fire, one twin clay retort directly over the brick retort, and of the same dimensions, and one oval clay retort in the centre above. The twin retorts are each 12 inches by 10 inches, and the top retort 15 inches by 10 inches in section, and 8 ft. 6 in. long, and the width of the setting is 3 ft. 6 in. In the course of the trial of this system at



Kilkenny the retorts were charged every three hours with about a hundredweight of coal, varying slightly according to the heats, and the quantity of gas produced was on the average 11.592 cubic feet. The average make per mouthpiece per day was 4754 cubic feet, with a small consumption of coke, the heats moreover being moderate. Notwithstanding this high make of gas, not the least alteration was observable in its illuminating power, the gas supplied in the town being, in fact, rather better than usual. The jet photometer at the works generally stood at the customary height, though it dropped a little before every draw, but not more than in working any other setting. The exhausters were worked at the same vacuum as usual. The points to which attention may be drawn in this system are—(1) the small dimensions of the retorts, (2) the increased quantity of gas made per ton of coal, and (3) the large make per mouthpiece. In drawing the charges, the first retorts taken are the right-hand bottom and the left-hand middle retort; an hour later the three other retorts are drawn. Thus there is one hour's rest, when the operation is repeated, giving eight charges in the 24 hours. The charges, in the trial at Kilkenny, were all fairly burnt off, the coke produced being rather smaller than usual, though quite large enough for domestic or any other use. The oven in which the retorts were set was a wide one, narrowed by brickwork to the width required. Small hot-air flues were provided in the side walls, for admitting air in the event of carbonic oxide being formed in the furnace; but they were not brought into use. From the small quantity of coal put into the retorts at a time, and the way in which they are relatively charged, much less cooling takes place, much less tar is formed, and there is, consequently, a larger yield of gas. One objection to the arrangement may be urged—that the retorts are too small for large works; however, no difficulty has been experienced in charging or drawing, and therefore for many country works they might even be preferred to larger sizes, as the work can be done by inferior men, and each retort is open but a very short time. Several settings of 15 in. by 10 in. retorts on this plan are, however, about to be erected at works where 40 million cubic feet of gas are made annually, and every means will be adopted for thoroughly testing the gas, tar, and liquor produced in the course of the trial, which it is expected will extend over three months in the course of the ensuing summer.

A New Gas and Steam Engine.

A gas-engine of peculiar construction has been patented by Messrs. S. Hallam and G. L. Scott, of Manchester, and the specification, which has recently been printed, describes many features in the invention which appear to be ingenious and novel. The inventors consume gas to generate steam, and provide certain arrangements whereby the products of combustion are used as propelling media in aid of the steam. To effect this the gas is burnt in a chamber under pressure. The carburetted hydrogen, or other suitable gas, to be used as fuel, and the air necessary to support its combustion, are separately compressed, and are then introduced in proper proportions into a combustion chamber formed in a steam generator, and are there ignited. The heat of the combustion thus produced is used to generate steam, and the combustion products pass into a kind of smoke-box, which communicates through a back-pressure valve with the interior of the boiler or steam passage. On starting, the products may be discharged into the air, or into the cylinder of the engine. A means of washing the smoke-gases is also provided, if required. The boiler specified as suitable is of the ordinary vertical form with internal water-tubes. The chambers for receiving the compressed air and gas are formed in the base-plate of the boiler. Uncompressed air and gas is burnt at first to generate steam sufficient to start the engine, after which the gas and air are delivered under pressure by their respective pumps in sufficient volumes to keep up combustion. So soon as the pressure in the furnace chamber becomes higher than that in the boiler, the before-mentioned back-pressure valve opens, and the products of combustion are discharged into the separator or boiler, whereby their temperature is reduced to that of steam under the given working pressure. The products of combustion mix with the steam, and pass with it to the working cylinder of the engine. Means are also provided to ignite the gas under pressure by spongy platinum, and so get up pressure to start without raising steam. The motor may thus be started as a gas-engine, and afterwards worked as a gas and steam engine combined.

The Distillation of Coal Tar.

Time was when tar and liquor were so worthless that the gas manager's ingenuity was greatly taxed to find out how to lose them, whereas now the greatest vigilance is evinced to find out how to catch and turn them to profitable account. The utilization of the liquor on the works has long been an established fact, but the elimination of the essentials of coal tar on the spot has not apparently received the same amount of attention. Perhaps the difficulties and attendant danger connected with the process, and which are dealt with in the improvements recently patented by Messrs. Trewby and Fenner, of Beckton, stood in the way. If so, all who are anxious to deal with this product themselves cannot do better than read the abstract of the specification of their patent which is published in another column.

A Result of Enterprise in the Colonies.

The Secretary of a Gas Company in New Zealand sends a local paper in which appears a paragraph advertisement, among the news, setting forth the advantages of the use of coke for the generation of steam in short or vertical boilers. He states that he has arranged for it to appear on alternate days, for, say, two or three weeks, and then he will alter it, advocating that "gas is superior to every other light-giving agent;" then that "cooking by gas is the best of all means," &c.; and so on all the year round. During the past year he says he has had a similar arrangement in force with another paper, and thus has kept the Company's manufactures constantly before the public. He has found that the best result has been obtained with coke. Two years since an immense pile had accumulated at the works, local coals were being sold for about 18s. per ton, and no one seemed disposed to take any coke. The result of the paragraphs appearing was very gratifying. All the coke was disposed of at 20s. per ton, and a demand being created, the price was raised to 25s. per ton, at which price the Company are now

selling all the coke they make, good steam coal being procurable at 17s. 6d per ton in quantities. The "Otto" gas-engine and cooking stoves have been pushed by the same means. There are eleven engines running—nominal horse power 25. The number of gas-stoves has been increased from 42 to 156 in 15 months. The price of gas being 10s. per 1000 feet, English gas managers with gas at a comparatively low price might take courage from this experience. The coals used by the Company are imported, and cost last year 33s. per ton.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

GAS APPARATUS EXHIBITIONS.

SIR,—We were glad to see in the JOURNAL of the 21st ult. a letter from Messrs. Beverley and Wylde exposing a recent attempt made by Messrs. Leoni, Wright, Billing, Hassall and Singleton, Davis, and Wilson, to exclude all other makers of gas stoves from competition at the gas apparatus exhibitions of Belfast, Dublin, and Glasgow; also your remarks thereon. This week we notice that Messrs. John Wright and Co. deny the statements made by Messrs. Beverley and Wylde, and whilst admitting that an association does exist, they intimate that it was formed with a view to the public good, by preventing such exhibitions drifting into "Cheap Jack bazaars," and to check "certain manufacturers whose commercial morality in the matter of piracy of designs," &c., would, in their opinion, "scarcely bear the light of day."

As one of the firms objected to, we should like, through the medium of the JOURNAL, to ask a few questions with a view of proving what the object of the association really was.

Is it not a fact that either Mr. Leoni or Mr. Ernest Wright, as representing the association, called upon the managers of the several exhibitions at the places named, and stated that the members of the association were the largest gas stove manufacturers in the kingdom; that without their assistance a successful show could not be had, and threatened that if any others were admitted they should decline to exhibit? Again, will Messrs. John Wright and Co. describe a single point of resemblance, in design, appearance, or principle, between our stoves and any other gas stoves ever before made; or state that they are in any sense of a "Cheap Jack" description; or name a single instance where we have refused to supply goods at prices marked at shows?

If none of these charges can be made against us, and the object of the association was as stated, why did they persistently endeavour to exclude us, and only admit us to the Dublin Exhibition on the last day, and after our threatening and taking active steps to open a second exhibition, and expose the attempted monopoly to the public of that city?

Torquay, Oct. 2, 1880. J. C. STARK AND CO.

Legal Intelligence.

SOUTHWARK COUNTY COURT.—MONDAY, SEPT. 27.

(*Before Mr.* STONOR, *Judge.*)

ILLEGALLY CUTTING OFF A SUPPLY OF GAS.

At the sitting of the Court this day, the Phœnix Gas Company (now amalgamated with the South Metropolitan Gas Company) were sued by Mr. West, of Warner Street, New Kent Road, for £9 3s. 8d., money paid to them under the circumstances hereafter detailed.

Mr. LYON appeared for the plaintiff; Mr. METCALF for the Company.

Mr. LYON, in opening the case, said the plaintiff, who occupied the Beehive public-house, in Warner Street, New Kent Road, sued the Phœnix Gaslight and Coke Company to recover the sum of £9 3s. 8d., which he had paid to them under the following circumstances:—On the 30th of June last the plaintiff moved into the Beehive public-house, the former tenant, a man named Sappit, having left the premises insolvent. On the following morning a collector of the Gas Company called upon him, and stated that the above sum of money had been left owing by the former tenant for gas supplied to the house, and asking Mr. West to pay the money. He at once refused, saying he was not liable for other people's debts; but the collector replied that if the money was not paid at the Company's office by noon of that day the gas would be cut off. Mr. West thought this was merely a threat; however, at three o'clock on the same afternoon the gas-pipe was disconnected. The plaintiff at once drove to the office of the Company, and offered to pay the money on deposit, while the case was argued. To this the Company declined to agree, and would not allow the gas to be again supplied to the premises until the money had been paid. Finally, Mr. West, to avoid further inconvenience, paid, under protest, the amount demanded, and the gas was again supplied, though not until between seven and eight o'clock in the evening. These were the facts of the case, and he (Mr. Lyon) was sure they would not be disputed by the Company.

The JUDGE: The Gas Company had certainly no legal right to cut off the supply of gas from an incoming tenant because the former occupier of the premises had not paid his gas bill.

Mr. LYON said they had not, as the Gas-Works Clauses Act, 1871 (34 & 35 Vict., c. 41, sec. 39), stated that "In case any consumer of gas supplied by the undertakers leave the premises where such gas has been supplied to him without paying the gas-rent or meter-rent due from him, the undertakers shall not be entitled to require from the next tenant of such premises the payment of the arrears left unpaid by the former tenant, unless such incoming tenant has undertaken with the former tenant to pay or exonerate him from the payment of such arrears." His client had certainly not made any such agreement.

Mr. METCALF, on behalf of the Company, said the reason of the action being taken by them was that their officials had a suspicion that there was collusion between the plaintiff and the outgoing tenant to defraud the Company of their money.

Mr. *West* was then examined, and his evidence corroborated the statement of his solicitor.

Cross-examined by Mr. METCALF, he swore that not until after he had moved into the premises did he know anything whatever about the amount owing for the gas, and he had certainly not made any agreement or promise, either to the outgoing tenant or to the Gas Company, to pay the money.

Mr. *Bryant*, one of the Company's collectors, was then called, and in cross-examination by Mr. LYON stated that when the premises were about to be transferred the gas account was rendered, and the broker of the former tenant said that it should be put upon the statement of claims.

The JUDGE said he considered the Company had no legal justification for their proceedings in the present case, and he should give judgment for the plaintiff.

Mr. LYON applied for costs upon the higher scale, on the ground of provocation.

Mr. METCALF objected, urging that the Company had been put to considerable inconvenience and loss of time.

Judgment was eventually given for the plaintiff, with ordinary costs.

Miscellaneous News.

EXHIBITION OF GAS AND ARTIFICIAL LIGHT APPARATUS IN GLASGOW.

The Exhibition of Gas and Artificial Light Apparatus which has for some time past been in course of arrangement under the auspices of the Philosophical Society of Glasgow, was opened in the Drill Hall, Burnbank, on Tuesday last, the ceremony being performed by the LORD PROVOST in the presence of a numerous company.

The exhibition comprises every kind of gas apparatus and appliance, including gas-burners, gas cooking and heating stoves, gas-meters, and gas-engines; various systems of electric lighting; lighthouse apparatus; gas tar products; shale oil and gasoline machines, &c., and to some of the most important of the exhibits, as well as to the exhibition generally, reference is made in another column.

The LORD PROVOST, in opening the proceedings, said that during the last two or three years there had been held many exhibitions of a character more or less similar to the one which it was his duty to open. The first of them was held at South Shields in the year 1877, and was a very great success. That exhibition was attended by upwards of 30,000 persons during the five days that it was open. Since then there had been others, attended with more or less success, in many large towns throughout the kingdom; two in Scotland—Greenock and Paisley—and recently two in Ireland—Belfast and Dublin. Until the present exhibition was projected there had never been any attempt made to diverge from the original idea of a display of gas apparatus; indeed, all exhibitions such as were referred to had, up to the present, been little more than collections of gas apparatus pure and simple. The Council of the Philosophical Society of Glasgow, however, might be said to have originated this exhibition, with the fixed determination to make it not only a gas apparatus exhibition, but an attempt to show to the fullest advantage everything that could be done in connection with the utilization of gas for lighting, heating, cooking, and as a motive power; and to combine along with it an effort to show how far electricity, more specially as a lighting agent, generally had been utilized, or was in the way of being utilized. Hitherto no such effort had been made to put electricity and coal gas together, or rather in opposition, as lighting agents within the same exhibition, so that inventors connected with them might have an opportunity of showing how far they had progressed in their inventive efforts. The exhibition, however, included several other departments or sections, in each of which there was a most elaborate and extensive display of valuable articles, and, doubtless, they might say that the exhibition was one for dealing with lighting and heating appliances. The Committee were in hopes that before the exhibition closed they would have the gratification of bringing under the notice of the Glasgow people several things of very great interest, both from a practical and from a scientific point of view, in connection with electric lighting, in order that this system of illumination might be thoroughly put upon its trial. The Committee some time ago resolved to appoint a Committee of Jurors, consisting of scientific experts, to report upon the various exhibits connected with electric lighting, and it was the aim of the Executive Committee that the trials should be of a most exhaustive nature if instituted. Doubtless they would be of that character, especially when it was considered that the Committee embraced amongst its members the distinguished Professor of Natural Philosophy, Sir William Thomson, and Dr. John Hopkinson, F.R.S., of London, a gentleman who, though young, had a world-wide reputation in connection with this department of experimental investigation. As the results of efforts in other directions in connection with lighting, he asked those present upon that and other occasions when they might visit the hall, to look around, and they would find very many successful efforts in connection with other kinds of apparatus dealing with coal gas apart from lighting. He was authorized to say by members of the Committee, as also by exhibitors of great and varied experience, that as a gas apparatus exhibition alone the undertaking had certainly never been equalled. And when they passed to coal gas as a motive power, he thought he was justified in saying that at no former exhibition of the kind had there been such a display of engines driven by that agent. In many parts of the exhibition there were exceedingly interesting exhibits supplying much matter to occupy the thought of both practical and scientific people. This was especially true of several collections of specimens connected with the treatment of coal tar, and which had resulted eventually in the production of the most beautiful artificial colouring matters ever introduced, and rivalling anything which Nature brings forth. The coal tar dyes were now very numerous, and their manufacture had become an immense industry both in this country and upon the Continent. Then, also, there were the products resulting from the distillation of shale, which were specially illustrated by Young's Paraffin Light and Mineral Oil Company.

Dr. FERGUS then referred at some length to the first exhibition of gas apparatus ever held in Glasgow—in 1846-47. He next touched upon the early history of gas, and afterwards described Professor Graham Bell's photophone—the latest use to which it was proposed to apply light.

Mr. J. DAY, on behalf of the Executive Committee, mentioned that it had been arranged, with the concurrence of the University authorities, to exhibit four electric lights on the central tower of the University buildings. The electricity would be supplied from an engine driven in the exhibition, and the height at which it was proposed to expose the lights was the greatest that had ever yet been attempted for the purpose.

Sir J. WATSON proposed a vote of thanks to the Town Council for their kindness in providing the supply of gas necessary for the purposes of the exhibition. In every respect the exhibition was a very complete one, and he trusted it would be of great advantage to the city, not only by way of giving knowledge and information, but also in stimulating inventive ingenuity.

Mr. WALLS briefly replied, and the proceedings terminated with a vote of thanks to the Lord Provost for presiding.

SALE OF GAS SHARES AT WAKEFIELD.—On Friday last Messrs. Howgate and Chapman offered for sale, by auction, 50 £10 shares (£4 paid) in the Wakefield Gas Company, which were afterwards withdrawn at £6 10s. each. On the same occasion some £5 shares in the Rothwell Gas Company were sold at the rate of £6 1s., £5 17s. 6d., and £5 17s. each.

COMMERCIAL GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the City Terminus Hotel, Cannon Street, E.C., last Friday—RICHARD BRADSHAW, Esq., in the chair.

The SECRETARY (Mr. H. D. Ellis) having read the notice convening the meeting, the Chairman affixed the seal to the register of Shareholders, and the minutes of the last general meeting were read and confirmed.

The following report and accounts were then taken as read:—

The Directors submit the accounts for the half year ended June 30, 1880.

The revenue account shows a net profit for the half year of £48,358 8s. 5d.; deducting therefrom £1575 for interest on debenture stock, there remains the sum of £46,783 8s. 5d., of which, having regard to the sliding scale and the price of gas charged during the half year, the sum of £34,600 is available for dividend. The Directors recommend the payment thereout of dividends at the rate of £11 5s. per cent. per annum upon the old stock of the Company, and of £8 5s. per cent. per annum upon the new stock, both less income-tax, and that the balance be carried to the reserve-fund.

A resolution will be submitted to the Proprietors, authorizing the Directors to make suitable arrangements for the retirement of Mr. Robert Jones, the Company's Senior Engineer, who has during the past 26 years rendered most important services to the Company.

No. 1.—STATEMENT OF CAPITAL (STOCK) *on June 30, 1880.*

Acts of Parliament relating to the Raising of Capital.	Dividend Authorized with Gas at an Initial Price of 3s. 9d.	Paid up.	Remaining to be Paid up and Unissued.	Total Amount Authorized.
		£ s. d	£ s. d	£ s. d
Commercial Gas Act, 15 & 16 Vict., cap. 155	10 per cent.	450,000 0 0	..	450,000 0 0
Ratcliff Gas Act, 18 Vict., cap. 12	Ditto.	100,000 0 0	..	100,000 0 0
Commercial Gas Act, 38 & 39 Vict., cap. 200	7 per cent.	105,180 13 6	174,819 6 6	280,000 0 0
		655,180 13 6	174,819 6 6	830,000 0 0

No. 2.—STATEMENT OF LOAN CAPITAL *on June 30, 1880.*

Acts of Parliament Authorizing the Loan Capital.	Description of Loan.	Rate per Cent. of Interest.	Total Amount Borrowed.	Remaining to be Borrowed.	Total Amt. Authorized.
Ratcliff Gas Act, 18 Vict., cap 12	Mortgage or Bond.	5 per cent.	..	£20,000	£20,000
Commercial Gas Act, 38 & 39 Vict., cap. 200	Debenture stock.	4½ per cent.	£70,000	210,000*	280,000
			£70,000	£230,000	£300,000

* At interest not exceeding 5 per cent.

Total share capital paid up (see No. 1)	£655,180 13 6
Total loan capital borrowed (see No. 2)	70,000 0 0
	£725,180 13 6

No. 3.—CAPITAL ACCOUNT.

Dr.

Expenditure.	
To Expenditure as on June 30, 1880	£667,650 16 7
Balance	57,529 16 11
	£725,180 13 6

Cr.

—	Certified Receipts to Dec. 31, 1879.	Received during the Half Year.	Total to June 30, 1880.
By Stock	£550,000 0 0	..	£550,000 0 0
New stock	70,000 0 0	£35,180 13 6	105,180 13 6
Debenture stock	70,000 0 0	..	70,000 0 0
	£690,000 0 0	£35,180 13 6	£725,180 13 6

No. 4.—REVENUE ACCOUNT, *for the Half Year ended June 30, 1880.*

To Manufacture of gas—			
Coals, including dues, carriage, unloading, and trimming (see account No. 8)	£55,170 13 10		
Salaries of Engineers, Superintendents, and other Officers at works	2,019 19 6		
Wages (carbonizing)	12,935 1 5		
Purification, including £1465 19s. 2d. for labour	3,627 15 6		
Repairs and maintenance of plant and works, materials, and labour (less £102 received for old materials)	10,119 8 5		
		£83,872 18 8	
Distribution of gas—			
Salaries and wages of Officers (including Rental Clerks)	£2,463 14 6		
Repairs, maintenance, and renewals of mains and service-pipes, including labour	5,169 19 8		
Repairs and renewals of meters	1,783 5 1		
		9,416 19 3	
Public lamps—			
Lighting and repairing		2,090 13 7	
Rent, rates, and taxes		3,533 5 3	
Management—			
Directors allowance	£1,250 0 0		
Company's Auditors	75 0 0		
Salaries of Secretary, Accountant, and Clerks	725 3 2		
Collectors commission	1,490 5 0		
Stationery and printing	652 8 5		
General charges	399 14 9		
		4,592 11 4	
Bad debts		992 0 6	
Law charges		2 15 4	
Superannuations		233 6 8	
Official officers		68 1 3	
Interest		19 15 9	
		£104,822 7 7	
Balance carried to profit and loss, net revenue account (No. 5)		48,358 8 5	
		£153,180 16 0	

By Sale of gas—		
Common gas, per meter, at 3s. 3d. per 1000 cubic feet	£105,489 15 7	
Public lighting and under contracts, common gas (See statement No. 9.)	10,451 12 10	
		£115,941 8 5
Meter-rental		2,133 7 3
Residual products—		
Coke, less £1649 17s. 11d. for labour	£17,514 6 5	
Breeze, less £114 4s. 1d. for labour	323 7 0	
Tar	7,943 1 5	
Ammoniacal liquor	9,231 16 1	
		35,012 10 11
Rents		93 9 5
		£153,180 16 0

No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

Interest on debenture stock	£1,575 0 0	Balance, Dec. 31, 1879	£63,939 14 2
Balance available for dividend carried to balance-sheet	69,923 2 7	Less amount available for dividend, to Dec. 31, 1879, and paid	£34,600 0 0
		Insurance-fund	6,200 0 0
			40,800 0 0
			£23,139 14 2
		Balance from revenue account (No. 4)	48,358 8 5
	£71,498 2 7		£71,498 2 7

No. 6.—RESERVE-FUND.

Balance on June 30, 1880	£32,208 18 0	Balance on Dec. 31, 1879	£30,944 3 7
		Dividend received	489 14 5
		Balance of amount available for dividend	775 0 0
	£32,208 18 0		£32,208 18 0

No. 7.—INSURANCE-FUND.

Balance on June 30, 1880	£15,881 9 11	Balance on Dec. 31, 1879	£9,347 11 1
		Dividends received	333 18 10
		Amount transferred from net revenue account	6,200 0 0
	£15,881 9 11		£15,881 9 11

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1879.	Received during the Half Year.	Carbonized during the Half Year.	In Store, June 30, 1880.
	Tons.	Tons.	Tons.	Tons.
Common	12,855	69,524 5	69,256 5	13,123
Cannel	1,449	5,388 1 6	4,922 1 6	1,915
	14,304	74,913	74,179	15,038

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

—	In Store, Dec. 31, 1879.	Made during the Half Year.	Used during the Half Year.	Sold during the Half Year.	In Store, June 30, 1880.
Coke—Chaldrons of 36 bushels*	4,653	97,081	31,061	68,731	1,942
Breeze do. do.	2,520	9,450	..	11,205	765
Tar gallons.	145,600	810,034	..	834,048	121,586
Ammon. liq.—Butts of 108 galls.	1,429	27,660	..	26,938	2,151

* Under "Weights and Measures Act, 1878."

No. 10.—STATEMENT OF GAS MADE, SOLD, &c.

Description of Gas.	Quantity Made. Meter Register.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lights.
		Public Lights and under Contracts (estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	771,613	50,867	649,168	700,035	8,487	708,522	63,091	4,856

BALANCE-SHEET.

To Capital—				By Cash at bankers		£76,171 9 2
For balance, per account No. 3	£57,529 16 11			Ditto in hand for current expenditure		900 0 0
Net revenue—				Amount invested		48,090 7 11
For balance, per account No. 5	69,923 2 7			Stores in hand—		
Reserve-fund—				Coals	£11,898 0 0	
For balance, per account No. 6	32,208 18 0			Coke and breeze	573 12 0	
Insurance-fund—				Tar and ammoniacal liquor	2,018 10 0	
For balance, per account No. 7	15,881 9 11			Sundries	2,136 8 4	
Unclaimed dividends	1,237 10 0					16,626 10 4
Deposits	8,343 18 11			Accounts due to the Company—		
Interest on debenture stock	95 0 0			Gas-rental, quarter ending June 30, 1880	£41,694 18 1	
Sundry tradesmen and others for amount due for coals, stores, and sundries	9,513 11 0			Arrears outstanding	2,502 18 2	
						44,197 16 3
				For coke and other residual products	£8,722 14 1	
				Sundries	21 9 7	
						8,747 3 8
	£194,733 7 4					£194,733 7 4

The Chairman: Gentlemen, the accounts which are in your hands give you so full and complete a history of the operations of the Company during the half year which they embrace, that I do not think it is necessary that I should trouble you at any great length with remarks upon them. I will, however, call your attention to two or three items, and I think by comparing them with similar items in the accounts for the corresponding half year of 1879, I shall afford you the best means of forming a just opinion of the state of our finances. I must first tell you that the price of gas charged during the half year ending the 30th of June, 1879, was 3s. 5d. per 1000 cubic feet, whereas for the half year ending the 30th of June, 1880, it was 3s. 3d. per 1000 cubic feet. Bearing this fact in mind, I will direct your attention first of all to the amount realized by the sale of gas. I find that in the half year ending the 30th of June, 1879, the amount realized by the sale of common gas by meter was £105,668, and the public lighting brought £10,308—together £115,972; whereas in the half year ending the 30th of June, 1880, the amounts were respectively £105,489 and £10,451, making together £115,941; so that you see the increased consumption of gas brought up the rental received during the past half year, when the lower price was charged, to within a few hundred pounds of what it amounted to in the corresponding half year of 1879, when the higher price was charged. To produce this result during the half year ending the 30th of June, 1880, I find that we carbonized 74,179 tons of coal, as against 73,455 tons in the corresponding half of last year; and while in the past half year we sold 700 million cubic feet of gas, in the corresponding half year we sold only 668 millions. Then if you turn to residual products, you will find that in the half year ending the 30th of June, 1879, they produced £30,092; while in the past half year they produced £35,012—an increase of £5000, and a very satisfactory increase, as I think. If you turn to the other side of the account, you will find that while in the half year ending the 30th of June, 1879, we paid for coal £60,079, in the half year ending the 30th of June last we paid £55,170. This, on the face of it, shows a very satisfactory saving—about £5000; but it is a larger saving than is apparent from the statement of figures, because you must bear this in mind, that during the half year when we expended £60,079 for coal, we carbonized only 73,445 tons, and sold 668 million feet of gas, whereas in the last half year, when the cost of coal was £55,170, we carbonized 74,179 tons, and sold 700 million feet of gas. I will not trouble you by going through other items on the debit side of the account. The totals are, for the half year ending the 30th of June, 1880, £104,822, whereas in the corresponding half year of 1879 they were £110,767. The result is that we have saved £1000, in round figures, in addition to the £5000 on the cost of coal. This, I think, is very satisfactory; but the most important item of all is that which I am coming to now—the net result. I find that the balance of net profit for the half year ending the 30th of June, 1880, amounted to £48,358; whereas in the corresponding half of 1879 it was £37,528. This I regard as a very fair increase. In the result, we are enabled to offer for your acceptance a dividend of 11¼ per cent. on the old stock, and 8¼ per cent. on the new; this will leave about £700 to be added to the reserve-fund, and nearly £12,000 to be carried forward. I should also mention that during the half year we have supplied gas of at least one candle power in excess of the standard prescribed by our Act of Parliament, and certainly of a purity far within the limit set forth in that Act, and this is so certified by the Chief Gas Examiner for the Metropolis, Dr. Williamson. Now, gentlemen, I must remind you that the object of the Act which the Company obtained in 1875 was that the gas consumers should participate equally with the Shareholders in the prosperity of the Company. Acting upon what we conceived to be the spirit of that Act, we have determined that we will reduce the price of gas from 3s. 3d. to 3s. per 1000 cubic feet, and that this reduction shall take effect as from the 1st of January next. The result of this will be that while the consumer is getting the advantage of having his gas at a reduced price—a reduction of 3d. per 1000 cubic feet—you, the Shareholders, will be entitled to receive increased dividends; and if it be my good fortune to meet you this time next year, I hope that I may be able to offer you a dividend of 12 per cent. on the old, and 9 per cent. on the new stock of the Company. Such an offer you would not, I presume, consider unacceptable. You will remember that at our last meeting I told you that, in order to provide for the increasing demand for gas, we had found it necessary to extend the Company's means of supply, and that we had entered into contracts for the construction of a new tank, and the erection of a gasholder at our Poplar station; and I also explained to you that to meet the outlay thereon, and to provide for other requirements of the Company, further capital would be needed. I proposed a resolution authorizing the Company to raise additional capital to the amount of £60,000, by the issue of new stock. This resolution you were good enough to pass unanimously, and in accordance with it the Directors issued the stock, offering it in rateable proportions to the different Proprietors, and I have to inform you that it has all been taken up by them with the exception of about £4000, which will be disposed of among them by tender. Since we met you last half year we have provided a new purifier at our Poplar station; the gasholder-tank is very nearly completed, and the additional holder will be erected in due course. I think you will then find your works to be in the most efficient state, and capable of meeting any demands upon them. I think this is all I have to tell you with respect to the operations of the Company during the past half year, and I trust I have said enough to satisfy you that your Company is in a sound and prosperous condition, and that you have a valuable property, and I have no doubt the increasing prosperity which has attended the operations of the Company in the past will be continued in the future. I now come to the concluding paragraph of the report—that which relates to the Company's Senior Engineer. Most of you are aware that Mr. Robert Jones has been the Engineer of the Commercial Gas Company for very many years. He entered the service of the Company in the year 1854, and from that time down to the present he has been actively engaged in its management. Many of you well know that the Company is to-day in a very different position to that in which it was when Mr. Jones received his appointment. The income of the Company was then somewhere about £60,000 or £70,000 a year, whereas it is now upwards of £300,000. When he joined the Company it was in a struggling condition; it is now in a most prosperous condition. It was then paying a dividend of 6 per cent., which it had great difficulty in earning; it now pays 11¼ per cent., which it earns easily, and with a handsome surplus, and will, as I have every reason to expect, soon pay 12 per cent. When Mr. Jones joined the Company the works were in a most unsatisfactory state, the mains being quite inadequate to meet the wants of the consumers. Mr. Jones has entirely remodelled and rebuilt the works and relaid the mains throughout the district of the Company, and the plant is now in the highest state of efficiency, and capable of meeting any demands which may be made upon it. You will remember that in the year 1875 the Commercial Company amalgamated with the Ratcliff Company—an amalgamation which I venture to say has proved most beneficial to both concerns. In the negotiations preparatory to this amalgamation, and in the proceedings for obtaining the Act of Parliament for confirming and carrying it out, the largest share of the work fell on Mr. Robert Jones. On taking over the Ratcliff Company's undertaking we also took over their Engineer, Mr. Henry E. Jones, of whose abilities and efficiency I desire to speak in the highest praise. Since the amalgamation, as you know, the Company have constructed entirely new works at Poplar. All these have been finished, and our own have been put in proper and efficient working order; and we think the time has now arrived when the Company no longer require two Engineers, but can effect an economy by managing with one only; and Mr. Robert Jones, who, as I have said, has been in the Company's service upwards of 26 years, and to whom its present prosperity is in an eminent degree to be attributed, is willing to retire. I need not remind you that on his retirement he is, as a matter of course, entitled to a retiring pension, and there can be no doubt or difficulty as to the amount, for under the scale which has been sanctioned and approved by the Board of Trade, and which I believe has been followed in all similar cases, Mr. Jones, after his long services, is entitled to a pension equal in amount to two-thirds of his present emoluments; and the Directors propose to award him such a pension. I have said this is the course usually adopted. I have looked into the precedents, of which I find many, some of recent date, and I am convinced you will all cordially and unanimously approve of the resolution which I shall presently put to you. The first resolution I have to submit is—"That the report and accounts be received, adopted, and entered on the minutes."

The Deputy-Chairman (Mr. J. D'A. Samuda) seconded the motion, which was at once carried unanimously.

The Chairman then moved the payment of the dividends recommended in the report.

The Deputy-Chairman seconded the motion, which was also carried unanimously.

The Chairman: The next resolution is the one to which I just now alluded—"That the Directors be and are hereby authorized to arrange for the retirement of Mr. Robert Jones, the Company's Senior Engineer, at such date and upon such terms as they shall think suitable and proper, including a retiring allowance not exceeding two-thirds of the emoluments now received by him."

The Deputy-Chairman having seconded the motion,

Mr. Coleman said he should be very sorry if such a resolution were passed without some one on the Shareholders side of the table testifying to the efficient manner in which Mr. Jones had conducted the affairs of the Company. As a Shareholder, he felt very much indebted to him for the great care and attention he had ever shown, not only to the interests of the Shareholders, but also to the interests of the public. He had great pleasure in supporting the proposal of the Board.

The motion was then put, and carried unanimously.

Mr. Pound asked whether the Directors had settled anything as to the disposal of the £4000 of new stock which was not taken up by the Shareholders.

The Chairman: Your own resolution says what we are to do with it. I think the Act of Parliament contemplates that any stock not taken up by the Shareholders should be disposed of to the best advantage.

Mr. Griffith Thomas: It must be so.

Mr. Pound thought that if Mr. Thomas were right, the motion he was about to submit would be within the Act of Parliament. He expressed his conviction that all the Shareholders were grateful to the Directors for their wisdom in carrying on the Company up to the point of anticipating a dividend of 12 per cent., and he would move a resolution giving the Directors the opportunity of sharing the remaining stock among themselves at par.

The Chairman: We could not take it.

Mr. Pound then moved a vote of thanks to the Chairman and Directors.

Mr. Pitt seconded the motion, and it was carried unanimously.

The Chairman, in reply, said: On behalf of my colleagues and myself I beg to tender you our best thanks for the vote you have just passed. It is extremely gratifying to us to receive these repeated marks of your approval, and you may depend upon it that our best exertions will be, in the future as in the past, devoted to furthering the interests of the Commercial Gas Company. We have always had satisfactory accounts to present to you for many years past, and I think I am justified in saying that there is every likelihood we shall continue to present you with equally good ones in the future.

A unanimous vote of thanks was next passed to the Engineers, Secretary, and staff generally.

Mr. R. Jones said he supposed, as he was the senior officer of the Company, that the other officers would look to him to respond for this vote, and he did so most heartily on his own and their behalf. As he had often told the Shareholders, there was nothing more encouraging to the officers of the Company than to know they had the approval of their Directors, and of the Shareholders when they met them every half year. It encouraged them to endure struggles, and particularly now when the manufacture of gas was most onerous indeed on the engineers of a company. The Shareholders might rely upon it that the approbation the officers received at

the meetings from time to time encouraged them upon all occasions, but more especially when they had to meet greater difficulties than usual. Before he resumed his seat he must offer to the Chairman and the Board his sincere thanks for the manner in which they had spoken of his long services to the Company, and it would be ungrateful indeed of him if he did not owe and perform the services he had to render them as their Engineer, because from the time he joined the Company up to the present he had had nothing but their approbation, and they had at all times strengthened his hands to do what he had been enabled to do for the Company. He should leave behind him an Engineer who came into the concern five or six years younger than he (the speaker) was when he entered it, and it was a very great pleasure to him to be able to say of him that he had made the study of gas and civil engineering his great pleasure, and had received the highest distinction of the Institution of Civil Engineers. His best thanks were due to the Shareholders for the very unanimous manner in which they had accepted the resolution enabling and empowering the Board to deal with him. It was what he had expected, and he was not disappointed. He thanked them as heartily as he could thank them for the manner in which they had received the resolution.

The proceedings then terminated.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

The following report and accounts of this Company for the half year ending June 30 last were submitted to the Proprietors at the Annual General Meeting, held on the 25th ult. :—

The Directors have pleasure in presenting the accompanying statement of accounts, by which it will be seen that the Company's business is steadily increasing.

The amount to the credit of profit and loss account is £4856 18s. 9d., from which the Directors recommend the declaration of the statutory dividends at the rate of 10 per cent. on original, and 7 per cent. on new ordinary capital for the half year (free of income-tax), which will absorb the sum of £3634 7s. 2d.

After payment of the dividends, the balance will be £1222 11s. 7d. From this amount the Directors have deducted the sum of £884 16s. 2d., and added thereto the dividend accrued on the present reserve, amounting to £115 3s. 10d., making together the sum of £1000, which has been invested in Consols, thus increasing the reserve to £5000, leaving the balance of £337 15s. 5d. to be carried forward.

The Directors have, as intimated in their previous report, made a call of £2 per share paid on the 1st of June last, and have since made a further call of £2 due on the 1st of October, thus completing the first series issued of new ordinary shares. This will enable the Directors to meet the increasing requirements of the district for the present.

The favourable results, as shown by the balance-sheet, have enabled the Directors to give notice of a reduction in the price of gas supplied by meter, from and after Jan. 1, 1881, from 4s. 3d. to 4s. per 1000 cubic feet.

The Engineer reports that the works are in very efficient condition, and quite equal to the requirements of the coming winter.

The laying of the new trunk mains has progressed satisfactorily; a short section only remains to be laid, which it is hoped will be completed in about a month from the present time.

At this meeting two Directors retire by rotation—namely, Messrs. Gripper and Malcolm—and one Auditor, Mr. Alexander Nicol; all of whom are eligible for re-election, and offer themselves accordingly.

Dr. *Revenue Account, for the Half Year ended June 30, 1880.* Cr.

Coals, including carriage, &c.	£5,648	0 3	Sale of gas—			
Purifying materials and sundries	366	13 11	52,577,600 cubic ft. at 4s. 3d. per 1000 feet, less discounts	£11,139	12 5	
Salary of Engineer	250	0 0	Public lighting and under contract	1,548	17 6	
Wages, &c., at works	1,267	6 2		£12,688	9 11	
Repairs and maintenance of works and plant, less old material sold	827	1 1	Rental of meters	454	13 5	
Salaries of Inspectors and Clerk	183	3 0			£13,143	3 4
Repair and maintenance of mains and service pipes	802	18 6	Residual products—			
Repairing, renewing, and refixing meters	173	1 10	Coke, less £222 15s. 11d. for labour and cartage	£1,600	18 6	
Lighting and repairing public lamps	328	14 11	Breeze	96	2 0	
Rent of siding	27	10 0	Tar	650	17 11	
Rates and taxes	557	5 11	Ammonia and liquor, less £288 15s. 0d. for acid	783	4 8	
Directors allowances	375	0 0			3,131	3 1
Salaries of Secretary and Clerks	291	5 0	Transfer fees		3 10	0
Collectors commission	294	5 2				
Stationery and printing	61	7 9				
General establishment charges and incidentals	142	3 4				
Auditors	35	0 0				
Insurance	8	19 8				
Bad debts	104	3 4				
Total expenditure	£11,743	19 10				
Balance	4,533	16 7				
	£16,277	16 5			£16,277	16 5

Sewer Ventilation by Street Lamp-Pillars.—Dr. C. E. Fitzgerald, writing to *The Times* last week on "Sewer Ventilation," says that as sewers are at present ventilated—that is, by means of gratings at certain intervals in the streets—the public run considerable risk of being poisoned by the foul emanations therefrom. This risk he thinks might be obviated in an efficient manner by a method so simple and inexpensive that he is surprised it has not already been put into practice. His plan is "to connect the upper part of the main sewers, at short intervals, with the interior of the ornamental columns enclosing the street gas-lights. The heat of the flame would create a partial vacuum, by means of which the sewer gas would be drawn upwards and partially consumed by the burner, partly discharged harmlessly into the air, high above the heads of the passers-by. I am quite aware this plan is not perfect, and is open to some objections; but it is, at any rate, far preferable to the present plan of ventilating through open gratings."

Brisbane Gas Company.—The report of the Directors of this Company for the half year ending June 30 last, stated that since the date of the last report the alterations, additions, and repairs therein referred to had been nearly completed. Provision for increased storeage at the works having been absolutely necessary, plans and specifications for a third holder had been prepared, and the Directors intended to ask for tenders. The cost of the extension was expected to be £11,000, and to meet this expenditure the unpaid balance on the last issue of shares had been called up. The Directors stated that they had decided to make a further reduction in the price of gas, to take effect from the 1st of August, and they recommended a dividend at the rate of 10 per cent. per annum, with bonus. The profit and loss account showed that in the six months reported upon £8947 was received from the sale of gas; rent, £50; licence fees, 10s. 6d.; balance brought forward, £450; bad debts recovered, 11s. 6d.—total, £9448. There was expended in the manufacture and distribution of gas and management, £3652; rates and taxes, £31; interest and discount, £1644. These sums, with the bad debts, amount written off for depreciation of plant, and the reserve, made a total of £6429, leaving a balance of £3019.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Thursday last—E. Fottrell, Esq., J.P., in the chair.

The Secretary and Manager (Mr. W. F. Cotton) read the Directors report as follows :—

In presenting this report, to which is annexed the statement of accounts, the Directors have to express their congratulations at the continued prosperity of the Company.

After deducting the interest upon bonds and debenture stock, &c., the amount standing to the credit of the profit and loss account for the half year is £35,352 18s. 9d., out of which the Directors recommend the payment of dividend at the rate of 10 per cent. per annum, free of income-tax.

The payment of divdend will absorb a sum of £29,500, leaving a balance of £5852 18s. 9d., which, with the balance brought forward from last account, makes a sum of £51,467 2s. 6d. to be carried to the credit of the next account.

Since the last account was rendered to the Shareholders, a sum of £26,800 has been issued in debenture stock, bearing interest at the rate of 4 per cent. per annum. This stock has been issued in lieu of bonds which fell due, and upon which interest was paid at the rate of 4½ per cent. per annum.

During the period to which this report refers, the works and plant of the Company have been well maintained, and are in excellent order.

Dr.—*Capital Account, for the Half Year ended June 30, 1880.*

	Expended this Half Year.	Total to June 30, 1880.
Expenditure to Dec. 31, 1879	..	£735,742 13 3
Expenditure on manufacturing plant, machines, storeage works, and other structures connected with manufacture (not in place of old ones), and new mains and service-pipes (not being in place of old ones), including laying same, paving, and other works connected with distribution	£785 0 2	
New meters (not in place of old ones), including fixings, &c.	973 18 8	
Horses, carts, &c.	252 3 10	
		2,011 2 8
Total expenditure	..	£737,753 15 11
Balance of capital account	..	7,388 14 1
		£745,142 10 0

Cr.—*Capital Account.*

	Certified Receipts to Dec. 31, 1879.	Received during Half Year.	Total Receipts to June 30, 1880.
Share capital	£589,944 10 0	£7,698 0 0	£597,642 10 0
Bonds and debenture stock	147,500 0 0	..	147,500 0 0
	£737,444 10 0	£7,698 0 0	£745,142 10 0

Dr.—*Revenue Account.*

To Manufacture of gas—			
Coals, including dues, carriage, unloading, and all expenses of depositing same on works	£46,335 11 6		
Purifying materials, oil, water, and sundries at works	602 5 0		
Salaries of Engineers, including Chief Engineer, Superintendents, and Officers at works	1,630 1 2		
Wages at works	7,647 5 10		
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	8,698 8 0		
	£64,913 11 6		
Less old materials sold	234 19 6		
		£64,678 12	0
Distribution of gas—			
Salaries of Surveyor, Chief Inspector, Inspectors, Assistant Inspectors, and Clerks in Light Office	£1,238 10 0		
Repair, maintenance, and renewal of mains and of service-pipes, including materials, laying and paving, and labour	2,031 14 11		
Repairing, renewing, and refixing meters	1,635 13 10		
		4,905 18	9
Public lamps—			
Lighting and repairing		419 9	7
Rents, rates, and taxes—			
Rents	£686 12 7		
Rates and taxes	1,875 1 1		
		2,561 13	8
Management—			
Directors allowances	£650 0 0		
Salaries of Secretary, Accountant, Clerks, Office-keepers, and Messengers	1,253 6 0		
Collectors commission	1,885 16 2		
Stationery and printing	190 18 4		
General establishment charges and incidentals	935 4 5		
Company's Auditors	80 0 0		
		5,043 4	11
Law and parliamentary charges		176 7	2
Bad debts		607 8	8
Abatements and allowances, &c.		1,148 18	3
Annuity account		500 0	0
Total expenditure		£80,043 13	0
Balance carried to profit and loss account		38,927 15	0
		£118,971 8	0

Cr.—*Revenue Account.*

By Sale of gas—			
Gas (412,162,500 cubic feet), at 4s. 3d., 4s. 6d., and 5s. per 1000 cubic feet	£89,556 19 11		
Public lighting and under contracts	4,483 16 6		
		£94,040 16	5
Rental of meters		2,654 17	10
		£96,695 14	3
Residual products—			
Coke, &c., less labour and cartage	£12,666 8 2		
Breeze	603 5 5		
Tar	4,910 17 5		
Ammoniacal liquor	2,714 14 6		
		21,095 5	6
Rents		206 11	5
Transfer fees		48 10	0
Dispatch, money received		925 6	10
		£118,971 8	0

The Chairman, in moving the adoption of the report, said: In putting this resolution to you, I have merely to call your attention to one or two matters. One of them is the rather significant fact that in comparison with the corresponding period this time twelvemonths our gas receipts are less by the amount of £2248. What this may be attributed to it is hard to define, but my own idea is that we had brighter weather in the past half

year than during the corresponding period last year, and thus the consumption of gas was lessened; but I think it is also attributable to another fact—namely, that the consumers, after the severe lectures they have had here and elsewhere, have been more careful in the use of their gas, and by proper burners have obtained the same light as before at less cost. I think this is just and right, and I believe it is a thing that will tend to a greater consumption of gas. People were always saying, "Our gas bill is increased," and I always replied, "If it is, it is your own fault, as you have not burned it properly;" and I thoroughly believe it is right to encourage all consumers to have proper fittings, so as to get the best value they can for their money. Our residuals are also less by £1683. This follows, of course, from our not having carbonized the same quantity of coal, because we have consumed less coal by 3000 tons at a less cost of £7900 for coal. This results from our having had very good contracts, and having these contracts enables us to show a profit of £3300 in excess of this time twelvemonths. I think you will say that this is a very satisfactory statement of accounts to exhibit. We are now in a new era of gas supply; we are beginning the 3s. 11d. charge, and we hope that at this price the consumption of gas will increase, for I invariably find that whenever a reduction takes place people become a little more lavish, and spend more. We do not want waste of gas, but we want consumption. To add to the legitimate consumption, we fostered and, I may say, inaugurated lately an exhibition of gas apparatus here in Dublin. That exhibition was most successful, and the results are already beginning to be felt. As I have stated before, we have opened a small showroom, where we exhibit different classes of stoves and burners. These we have determined to let out on hire at a rental. We do not mean to interfere with trade in any way whatever. We allow persons who wish to buy apparatus to go and purchase them from the proper people; but we conceive it to be your interest that we should have these articles here, and that consumers should know where they can get them on hire. With this view we are determined to push as far as we can the legitimate consumption of gas. The exhibition turned out very well, the attendance being very enormous, and already several stoves have been hired and several others bought. We have during the last half year changed £23,000 of our debenture stock from 4½ into 4 per cent. stock, thereby lessening the cost, and showing that your stock is held in proper estimation. We have issued on new capital account £7698, and this amount appears in the accounts for the half year I am alluding to. The balance of £10,000 does not appear in that account, and will have to wait for the next, because the persons to whom that sum was appropriated were those entitled to have the shares *pro ratâ*, and the rest was absorbed by applications from various people—the old Proprietors, however, getting the preference—so that in this account we have only to deal with £7698 of new capital. On that new capital you are aware £2 was called up at once, and we propose making another call on it that would be due on the last day of December, thus keeping the amounts straight from half year to half year, and making £4 paid, upon which the Proprietors will be entitled to the allocated dividend. This £7698 is placed to capital account; and if we had not received this additional capital at the time we did, the balance would appear on the wrong side. We had money enough to carry on with the hanging balance, but that balance we are now going to invest as we have power, and are, in fact, ordered by Act of Parliament to do. We have already made a beginning by investing some of it in bonds. Therefore it will give a stability to the Company which will keep it straight for any contingency that may occur.

Mr. D. Drimmie seconded the resolution, which was carried unanimously.

The Chairman next moved—"That a dividend at the rate of 10 per cent. per annum be declared, free of income-tax."

Mr. Tallon seconded the motion, and it was agreed to unanimously.

Alderman Tarpey, J.P., having been called to the second chair,

Mr. Vance, J.P., moved a vote of thanks to the Chairman and Directors. The statement of accounts and the remarks of the Chairman testified, he said, to the prosperity of the concern, and the feelings of the outside public showed the affairs of the Company were admirably conducted.

Mr. Burke seconded the resolution, which was passed unanimously.

Mr. E. Fottrell thanked the Shareholders for their uniform kindness towards him as Chairman of the Board, and expressed a hope that his colleagues and himself would continue to deserve the confidence of the Proprietors.

Mr. Brunker said, as Auditor of the Company, he had had the opportunity of investigating thoroughly the affairs of the concern, and seeing practically how they were carried on. With the knowledge thus personally acquired, he felt it a privilege to propose a vote of thanks to Mr. W. F. Cotton, the Manager and Secretary of the Company, for the very able manner in which he fulfilled the important duties of his responsible offices. He (Mr. Brunker) would, with the permission of the Shareholders, include in the vote the staff of the Company.

Mr. Cree seconded the motion. Recently he had had an opportunity of expressing his high opinion of Mr. Cotton's abilities, and the extreme diligence with which he conducted the operations of the Company. He was glad that the Directors had shown the people of Dublin that there was an ample field for the use of gas besides the lighting of dwelling-houses. There was one other point he would mention. It would be very satisfactory if the decrease in the consumption of gas during the past half year was due, as the Chairman stated, to the lessened amount of waste by consumers. Such a fact enabled the Company to deal with greater confidence with the public, because it showed that complaints ceased when the consumers better knew how to economize gas and prevent waste, which he believed took place in many houses in Dublin.

Alderman Tarpey said, before putting the resolution, in which he fully concurred, he would refer to a fact that showed conclusively the good management of Mr. Cotton and the staff which he directed. The fact was this—that, though the consumption of gas for the six months was less than during the corresponding period of last year, the profit was more than £3000 higher. This happy result was due to the great care and watchfulness of Mr. Cotton, aided by the other officials. He might add that it was clear that the decrease referred to in the quantity of gas consumed did not interfere with the Company's prosperity. The Shareholders were secure of their 10 per cent., with a good balance over.

The motion was unanimously agreed to.

Mr. Cotton, in returning thanks, said he was very grateful to the meeting for this renewed unanimous token of their confidence, and he would assure them that no effort would be wanting on his own part and that of the staff to retain the future good opinion of the Shareholders.

The proceedings then terminated.

The Public Lighting of Wymondham.—On the night of Saturday, the 25th ult., the streets of Wymondham were again illuminated with gas, after having for the past three years been lighted with oil. General satisfaction appears to be expressed at the improvement thus effected in the public lighting, especially on the main road to the railway station, which is now fairly illuminated, and should the same amount of light be continued it will add much to the comfort of visitors and residents, all of whom are to be congratulated on a change which cannot but be for the general good.

SHEFFIELD UNITED GAS COMPANY.

The Fifty-first Ordinary General Meeting of this Company was held on Friday last—Mr. F. T. Mappin, M.P., in the chair.

The following report and accounts were presented:—

On reference to the accounts which the Board have now to submit, it will be seen that the earnings for the half year ending the 30th of June last are less than the maximum authorized dividend for that period by the sum of £2685 14s. 7½d., being the difference between the balance brought over from the preceding account (which was £17,737 5s. 1½d.), and that carried forward at the end of the half year (which was £15,051 10s. 6d.). That there would be a deficiency was anticipated by your Directors when they decided upon the reduction in the Company's charges, made in the autumn of last year, but the actual amount of the deficiency is not greater than your Board then contemplated it probably would be.

The Company's reserved fund stands as it did in the balance-sheet submitted to the Shareholders in April last—namely, at £67,055 1s., and your Directors consider, as they trust you also will, that the accounts now presented are of a most satisfactory character.

Your Directors have the pleasure to recommend that there be paid for the past half year a dividend after the rate of 10 per cent. per annum on all the paid-up capital. Such dividend will be as under, viz.:—

On £135,000 class A stock	£5,750 0 0
On £209,053 10s. class B stock	10,452 13 6
On £99,700 class C stock	4,985 0 0
On 12,937 new ordinary £10 shares (second issue), £1 per share paid up, being 4s. per share, or	2,587 8 0
On 11,462 E shares of £8 10s. each, £2 per share paid up, being 2s. per share, or	1,146 4 0
	£25,921 5 6

Of the E £8 10s. shares 517 were not taken up by the Shareholders to whom the same were offered; and as the Companies Clauses Act, 1863 (which applies to them) provides that the Company may dispose of them in such manner as the Directors think most advantageous to the Company, your Board will shortly put them up for sale by public auction.

Your Directors are glad to find that the application of gas for cooking purposes, to which the public attention has lately been much directed, is steadily on the increase.

The additional works in course of construction at Effingham Street are in such a state that the intended large new gasholder there will, your Board anticipate, be ready for use by the commencement of the forthcoming year.

The three elected Directors who now retire by rotation all offer themselves for re-election. They are Mr. Mappin, Mr. Hutchinson, and Mr. Sorby.

Capital Account, June 30, 1880.

Receipts.

Class A stock, fully paid up		£135,000 0 0
Do. B do. do.		209,053 10 0
Do. C do. do.		99,700 0 0
12,937 new ordinary £10 shares (second issue), £4 per share paid up		51,748 0 0
11,462 E £8 10s. shares, created May 6, 1878, £2 per share paid up		22,924 0 0
Amount raised on mortgage	£18,300 0 0	
Less paid off since	600 0 0	
		17,700 0 0
		£536,125 10 0

Expenditure.

Lands, buildings, parliamentary and other expenses, works, and machinery (including mains to June 30, 1855) to Dec. 31, 1879	£403,668 14 2½	
Less depreciation	1,928 0 5	
		£401,740 13 9½
Ditto, extensions to June 30, 1880		8,711 1 9
Mains from June 30, 1855, to Dec. 31, 1879	£78,336 3 11	
Less depreciation	482 0 1	
		77,854 3 10
Ditto, extensions to June 30, 1880		1,336 0 4
Meters to Dec. 31, 1879	£30,648 3 11	
Less depreciation	383 2 6	
		30,265 1 11
Ditto, extensions to June 30, 1880		740 17 0
Balance		15,477 11 4½
		£536,125 10 0

Revenue Account, for the Half Year ending June 30, 1880.

Receipts.

Balance brought from last account	£17,737 5 1½
Gas and meter rents	57,548 1 1
Coke, tar, ammonia water, and other residual products	21,166 18 2
Sulphate of ammonia, sale of gas-fittings, and work done (after deducting all charges), and house and other rents	3,602 11 9
Interest received from investments of the reserve-fund	1,333 11 10
	£102,088 7 11½

Expenditure.

Production of gas	£60,964 7 9½
Mortgagees interest, less received from Bankers and others	151 4 2
Balance	40,972 16 0
	£102,088 7 11½
Dividends payable Oct. 9, 1880	£25,921 5 6
Balance to be carried forward	15,051 10 6
	£40,972 16 0

General Balance.

Balance of revenue account	£40,972 16 0	Ledger balances, and accounts owing to the Company	£39,927 19 7
Ledger balances, and accounts owing by the Company	33,827 5 7½	Stores in hand	18,002 18 2
Balance of capital account	15,477 11 4½	Balance due from Bankers	33,345 2 5
		Balance due from Cashier	1 12 10
	£90,277 13 0		£90,277 13 0
Reserve-fund, invested Dec. 31, 1879	£67,055 1 0		

The Chairman, in moving the adoption of the report, said the Shareholders would observe in the balance-sheet that the working for the half year showed a deficiency of £2685 14s. 7½d. with regard to the sum required to pay their full dividend, and this amount the Directors would have to take from the balance in hand—not from the reserve-fund, which remained intact as it was. They had a balance of £17,737 5s. 1½d., and this, after they had paid the maximum dividend, would remain at £15,051 10s. 6d. Some explanation of this deficiency might possibly be thought necessary. The Shareholders must bear in mind that the Company were now selling gas at 3d. per 1000 cubic feet less than in the corresponding period of last year. When the Directors made this reduction they were fully aware that there would be a deficiency, but the increased consumption of gas had enabled them to bring it down to the sum he had already mentioned. These items were of an exceptional character, and he believed but for them the Company would have been enabled to pay their full dividend, without taking anything from the balance, even at the present low price of gas, which now ranged from 2s. to 2s. 4d. The Directors had expended more by £2034 in coals and carriage during the half year, and the repair of retorts was also a very large item, showing an increase over the corresponding period of last year of £4388. They had, further, the misfortune to have a coke shed fell down, and its re-erection involved

an expenditure of £1288, which had come out of revenue. Then, again, in consequence of the sinking of the ground at Grimesthorpe, through the working of coal there, they had had to reconstruct a sewer which had become quite unfit for use, and this had cost £745. Another item of additional expenditure was £315 for alteration of scrubbers. The local rates were also a large item of increase—£874 in the half year—and there had been received £4529 less for gas in the same period; thus, with the items of additional expenditure he had mentioned, making a total of £14,173 against the Company. Turning to the favourable side of the half year's accounts, the Company had received more for coke by £1807, and for tar by £1735; and the interest on the reserve-fund amounted to £1333. Had it not been for the exceptional items to which he had alluded, and which had to be met out of revenue, the Company would have been in a very favourable position. The Shareholders would find that the quality of the gas had not been decreased. Mr. Wilkinson, the Corporation official, who tested the gas, reported that the average illuminating power had been 16·63 candles; but if it had been tested by the Sugg burner, which most of the other gas companies in the country used, the power would have been shown to be 18·13 candles. When Mr. Hobson occupied the chair at the meeting in October last he said that the construction of the new gasholder in Effingham Street was going on favourably. Since then, however, the Directors had had considerable difficulty with it, from one cause or another; but now all was going on to the satisfaction of the Engineer and the Board. He observed in one of the papers read before the Chemical Section of the British Association, that a Committee had some time since been appointed to make a report on the best means of developing the light obtained from coal gas. That report, the concluding portion of which was presented on the occasion referred to, he believed to be a most valuable one, and showed clearly how necessary it was for those who consumed gas to look after their burners and fittings. It was as important for them to do this as it was for those who manufactured the gas to see to its standard power. The Committee he referred to showed in tabular form a comparison of burners in use up to the present time, classified according to the pressure applied, and they distinctly proved that after a certain high pressure was reached, the more gas was sent through them the less was the light obtained. Consumers should therefore see that they did not have too much pressure upon their burners, and they could only do this by the use of governors. These were supplied by the Company and others, and could be fitted to each of the burners in a room. In addition to these regulators the character of the globes was also worthy of consideration. The public would find that the wider the openings were at the bottom, the better would be the light obtained. By attending to these two particulars, it appeared from the report, to which he had directed attention, people would get a maximum amount of light for the smallest consumption of gas. Since the Shareholders had last met, proof had been given that all gas companies, however well managed, were liable to accidents, and it was therefore important that they should have reserve-funds to meet the additional expenditure thus involved. He referred to the accident which occurred to one of the mains of The Gaslight and Coke Company in London. It was no doubt a very serious matter, but the Chairman of that Company told the Shareholders that their reserve-fund would enable them to pay all the damages for which they were liable without trenching upon the dividend. This, he was sure, must be satisfactory, and he had no doubt that the accident which had occurred would cause those employed in laying gas-mains to realize the serious results which might attend any want of care on their part. There was one item in the accounts which appeared to him to be a very large one, and it was on the unfavourable side. He noticed that in Nottingham the rates and taxes paid by the Gas Company in twelve months amounted to £3734. Their capital was pretty much the same as that of the Sheffield Gas Company, but the amount paid in Sheffield last year for rates and taxes—not income-tax, but local rates—was £3836. He did not contend that they should pay in Sheffield the same amount as was paid in Nottingham, but the heavy nature of the rates paid by the Sheffield Company had been fully demonstrated that morning, before himself and his colleagues, by their having to sign a cheque for the district rate, amounting to £3920, and also one for £862, the amount of the Brightside poor-rate. Whether or not the poor rates and municipal matters were managed as economically in Sheffield as they were in Nottingham, would be a difficult question for any one to answer; but certainly the Gas Company of Sheffield appeared to be very heavily burdened when they had to meet this amount of taxation. The only other matter he would allude to was that since they had last met they had appointed a new Engineer—Mr. John Key. From what the Directors had seen of this gentleman he (the Chairman) must say that they were very well satisfied with him, and he hoped he would remain with them, and give them the same satisfaction, as long as he was their servant, as he did at the present time.

Mr. J. WILSON seconded the motion. Referring to the Chairman's comparison between the rates of Sheffield and Nottingham, he pointed out that there was three times more piping at the former place than at the latter. He attended a meeting of the Assessment Committee the previous week, and the Gas and Water Companies were then spoken of as being too lightly rated. The Committee were, in fact, going to re-rate, for it was stated that there were miles of piping in Sheffield for which no rates were paid. Turning to another matter, would the Chairman inform him whether the Directors were going to make any fresh calls?

The CHAIRMAN said possibly about the 1st of January next. The Directors would have to go to the oldest shares first. With reference to the pipes in Sheffield and Nottingham, he must differ from Mr. Wilson. He had no authority for saying it, but when he saw that the Nottingham Company went to Long Eaton on the one side, and Hucknall and elsewhere on the other, it appeared to him that the area of pipes there should be larger than at Sheffield. He had no authority for what he was saying, but made the statement simply from his observation, knowing the locality very well. At all events, he thought the Sheffield Company were very heavily rated. The Company paid a large sum, and he hoped that under no possibility would it be increased.

The motion was then put and carried, and the usual resolution as to the payment of dividend was passed.

On the motion of Mr. T. WATERHOUSE, seconded by Mr. E. WILSON, Mr. F. T. Mappin, M.P., was unanimously re-elected a Director of the Company, as were also the other retiring Directors; and a vote of thanks was passed to the former gentleman.

The CHAIRMAN, in thanking the Shareholders for the compliment they had paid him, said he held to his opinion that the prospects of the Company were unimpaired either by the electric or any other light. He had paid attention to the way in which the Company was managed, both in the office and at the Board, and the Shareholders might depend upon it that as long as the affairs of their undertaking were conducted in the way they had been and would be, their property was well secured to them. Although the Company were able to sell gas at a low price, he anticipated that as Sheffield progressed they would be able to reduce it still further.

The proceedings then terminated.

AUSTRALIAN GAS COMPANY, SYDNEY, NEW SOUTH WALES.

The Report of the Directors of this Company for the half year ended June 30, 1880 (the 89th half year), stated that the profits, after deducting for bad debts, interest on borrowed money, cost of repairs and renewals, deterioration of plant, working expenses, and all charges, amounted with the balance brought from last account (viz., £1631 7s. 2d.) to £24,351 4s. 1d.; the Directors recommended a dividend for the six months of 7½ per cent., which would absorb £18,740 16s. 4d., and leave a surplus of £5610 7s. 9d., out of which it was proposed to place to the reserve-fund £3000, leaving a balance to carry forward of £2610 7s. 9d. The growing demands for gas requiring further additions to the Company's manufacturing and holding powers, the Directors had found it necessary to purchase the property adjoining the northern boundary of their head station, and the requisite plant would be immediately ordered from England. They had also determined upon supplying gas to Ashfield, Burwood, and the surrounding districts, and for this purpose they had purchased an additional site for works. The plant had been ordered, and it was hoped that by next winter the works would be in full operation. The following is the

Net Revenue Account, for the Half Year ended June 30, 1880.

Dividend payable Jan. 30, 1880	£18,740	9	6	Balance at Dec. 31, 1879	£28,686 16 8
Reserve-fund	8,315	0	0	Profit brought forward	22,719 16 11
Balance to next account	24,351	4	1		
	£51,406	13	7		£51,406 13 7

Liabilities and Assets, June 30, 1880.

Sundry creditors — temporary loans	£123,453	10	7	Fixed investment: — Land, buildings, and machinery at head station and the five out-stations (Haymarket, Woolloomooloo, Balmain, Petersham, and Five Dock); main and service pipes laid; implements and furniture	£353,382	13 1
Suspense accounts	6,265	1	10			
Capital paid up	250,000	0	0			
Reserve-fund	27,252	7	10			
Reserve for replacement of meters	4,478	16	10			
Dividends unclaimed	1,636	10	0			
Unappropriated profits	24,351	4	1	Floating investment:—Coals, residual products, apparatus in store, meters, lamps, and pillars	59,034	14 3
				Sundry debtors	21,319	13 2
				Suspense accounts	3,093	8 3
				Cash	607	2 5
	£437,437	11	2		£437,437	11 2

AUCKLAND (NEW ZEALAND) GAS COMPANY.

The Eighteenth Annual Meeting of this Company was held on Friday, July 30th—Mr. T. MACFARLANE in the chair.

The SECRETARY (Mr. E. B. Parsons) read the report of the Directors, as follows:—

The accounts for the last year, now laid before the Shareholders, show that very satisfactory progress is still being made in the Company's business.

The income for the year ended June 30, 1880, was £19,582 0s. 11d., and the expenditure £11,204 17s. 8d., which left a profit of £8377 3s. 3d. The Directors, therefore, propose to pay a dividend for the past six months, after the usual rate of 7s. 6d. per share, which with the interim dividend paid in January last will absorb the sum of £6128 5s. The Directors also propose to give the consumers the benefit of the Company's increased prosperity by a reduction in the price of gas. This reduction it is proposed shall take effect on all gas consumed after the meters are inspected in the middle of September.

During the past year additions have been made in the number of retorts, and a new gasholder, capable of containing 142,000 cubic feet, has been erected at Freeman's Bay.

The number of gas consumers, besides public lamps, is now 1760, being an increase of 220 over the previous year. The length of street-mains laid during the past year amounted to 2500 yards only.

Messrs. Newman and Wilson, as Directors, and Messrs. Pearce and White, as Auditors, retire from office. They are eligible, and offer themselves for re-election.

Dr. *General Balance-Sheet, June 30, 1880.* Cr.

Paid-up capital on 8471 shares at £5	£42,355	0	0	Expenditure on capital account— Freehold and leasehold land, buildings, manufacturing and distributing plant and meters	£60,806	15 4
Premium on shares sold	8,183	18	8			
Profit expended on permanent works	3,256	5	1			
	£53,795	3	9	Stock of mains, service-pipes, and materials unemployed	994	2 9
Amounts owing by the Company	472	4	7	Stock of coal and shale	972	0 0
Cash at call	3,470	0	0	,, residual products	490	1 8
Dividends unclaimed	9	15	0	,, gas-stoves	133	2 8
Balance at credit of reserve-fund	4,340	0	0	Cash in Bank of New Zealand	1,654	0 7
Profit and loss—balance at credit thereof	6,834	11	0	Amounts owing to the Company	871	11 4
				Debentures, reserve-fund investment	3,000	0 0
	£68,921	14	4		£68,921	14 4

Profit and Loss Account, for the Year ended June 30, 1880.

Coals carbonized	£6,024	7	7	Gas	£17,537	8 1
Stokers wages	1,101	14	1	Residual products	2,016	9 4
Distribution of gas and meter inspection	174	19	4	Transfer fees	8	3 6
Water at works	72	0	6			
Insurance	8	17	6			
Wear and tear	826	1	11			
Purification of gas	115	0	0			
General expenses—						
Directors and Auditors	250	0	0			
Salaries	1,205	16	0			
Stationery, printing, &c.	212	7	1			
Petty cash	26	6	0			
Legal expenses	78	9	6			
Rent	203	8	6			
Rates and taxes	412	9	2			
Office furniture	36	1	0			
Survey fees	18	18	0			
Interest	396	19	3			
Bad debts	41	2	3			
Balance carried down	8,377	3	3			
	£19,582	0	11		£19,582	0 11

Balance at credit, June 30, 1879		£4,360	12 9
Balance brought down		8,377	3 3
		£12,737	16 0
Less dividend declared July, 1879, on 7871 shares, at 7s. 6d. per share	£2,951 12 6		
Interim dividend, January, 1880, at do.	2,951 12 6		
		£5,903	5 0
		£6,834	11 0

The CHAIRMAN moved, and Mr. J. NEWMAN seconded, the adoption of the report and accounts.

Mr. B. IRELAND moved as an amendment that the dividend be 10s. per share, which he said the accounts showed the Company could pay.

After some discussion, the amendment was rejected.

The Chairman stated, in reference to the proposed reduction in the price of gas, that considerable pressure had been brought to bear upon the Company in this matter. The reduction would probably take place in September, but the exact amount was not definitely fixed. The Directors saw their way clear to pay the Shareholders the usual dividend, even with gas at the reduced price, as there was a growing increase in the consumption, which would be accelerated by the contemplated reduction.

The retiring Directors and Auditors were then re-elected, and the proceedings closed with votes of thanks to the Chairman, Directors, and Officers of the Company.

RIO DE JANEIRO GAS COMPANY, LIMITED.

A circular letter, under date of the 22nd ult., has been addressed to the Shareholders of this Company by the Secretary (Mr. Thomas Dawson), setting forth the present position of the new contract between the Imperial Brazilian Government and the Company.

After stating that, as the result of prolonged negotiations, a new contract for the supply of gas to Rio was signed on the 21st of April last year, to replace the old one which expired on the 25th of the previous month, the letter states that this new contract required confirmation by the Brazilian Legislature, but the Board consented to continue the gas lighting upon the terms of this contract while awaiting its confirmation. The law approving the contract had to be read three times, both in the House of Deputies and the Senate. During the session of 1879 it was read in the House of Deputies twice, and in the present session it came on for the third reading on the 24th of August, when Senhor Buarque de Macedo, the present Minister of Public Works, proposed certain modifications which were accepted by the House, and the project of law has been or will be sent up in that form to the Senate. The letter concludes: "The Board think it expedient here to abstain from remarking on the evident injustice which would be done to the Company if such a measure were carried into effect, for they trust that the enlightened wisdom of the Senate and Emperor will prevent their sanction being given to it. The Shareholders may rely on the best attention of the Board being given to the protection of their interests, and on receiving early information of any fresh incidents of importance that may present themselves."

The substituted Bill, containing the modifications above alluded to, provides for a revision of the contract made between the Company and the Government on the 21st of April, 1879. The following are the bases of the proposed revision:—

1. Reduction in the price of the cubic mètre of gas.
2. Provision that at the termination of the contract all the Company's *matériel* shall belong to the State. This basis may be replaced by a reduction of the period of the contract.
3. Liability of the Company, without any further charge to the State, to substitute, in lieu of the present system of lighting, that of the electric light, or any other approved system which, upon arbitration, shall be considered preferable. This substitution shall only be carried into effect if the Government require it, giving at least three years previous notice, and the price of lighting being revised.
4. Subject to any agreement to the contrary, the liability for cost of lighting shall be solely at the charge of the consumer.

Upon the revision being made, it is provided that, without any additional liability upon the State or private persons, excepting such as already appears in the contract of April 21, the terms shall be considered as approved; but in default of an agreement being made with the Company, the Government may invite tenders for a new contract. In this case the Government are likewise authorized to indemnify the Company for the value of the *matériel* of lighting, in accordance with that to which they are lawfully entitled, and in accordance with the valuation already made, or which may be made, by experts of the Government.

In case a new contract is not entered into, it is proposed to allow the Government to make any provisional arrangement with the Company "for the continuation of the service of the illumination of the city."

THE GAS APPARATUS AT THE MANCHESTER INDUSTRIAL EXHIBITION.

(FROM OUR OWN CORRESPONDENT.)

The Judges awards in the section of the Manchester Industrial Exhibition devoted to gas appliances were made known on Friday, and the prizes given consist of twelve silver and nineteen bronze medals, eight of the former and nine of the latter being awarded by the Gas Committee of the Manchester Corporation. Some of the more prominent exhibits in gas apparatus, so far as novelty is concerned, have already been noticed, but there are other exhibits also deserving of reference, and these can now be dealt with in a short sketch of some of the prize-winners.

Gas-cooking stoves, as I have already pointed out, have been the chief feature in this section. The exhibits have included all the best known as well as the most recent inventions in gas-stoves, and as no less than five silver medals have been awarded to this particular class of apparatus, this may, perhaps, be taken as an indication of the complete success with which gas is now, amongst manifold other uses, being applied to the purposes of cooking.

Amongst the gas stoves, we have already alluded to Messrs. Greene and Son's exhibit, to which has been awarded a Corporation silver medal, and Messrs. Stark and Co.'s Cox's "Saveall" gas-cooking family stove, to which has been awarded a Corporation bronze medal. Messrs. Greene and Son have also taken a Corporation silver medal for their "Thermogene," or instantaneous water heater, which is a very ingenious apparatus for supplying hot water to baths, kitchens, or for general use. The apparatus is very simple in its constrnction, and consists of a small copper boiler, which requires no fixing, containing inside a coil of copper piping, which in operation is brought in contact with a number of oxygenic gas-burners, and the water passing direct from the supply-pipe through the copper coil becomes heated at once, without coming in contact with the gas, and thus leaves the apparatus as pure as when it entered. A third silver medal has been awarded to Messrs. Greene and Son for a collection of Brönner's patent burners, and Messrs. Stark have also been awarded a bronze medal for M'Cormack's stocks and dies, wrench, and expanding taps for gas-fitters.

Of the other exhibits which have not yet been noticed, the most prominent are those shown by Messrs. Elliott, Alston, and Olney, of Manchester, who have taken one Corporation silver, and six Corporation bronze medals, and their stand contains perhaps the largest and most varied collection of gas-stoves in the exhibition. Messrs. Wright and Co.'s gas kitchener, for which they have been awarded the silver medal, contains several new improvements. The chief feature—and this is a principle the importance of which is now being generally recognized by gas-stove manufacturers—is that it is cased outside with a non-conducting material, which retains the heat of the stoves much better than where they are simply constructed of the ordinary iron casing, and, consequently, ensures an economical use of gas. The burners for boiling are also so arranged that toasting or grilling is effected by means of a fire-brick, in the place of the ordinary tin deflector. Bronze medals have been awarded to the following five other descriptions of gas stoves exhibited by Messrs. Elliott, Alston, and Olney; Galli and Co.'s combined gas and coal kitchen range with gas oven; Billing and Co.'s £6 and £1 16s. "Sundial" gas cooking stoves; Galli and Co.'s atmospheric gas-cooking stove; and Wright and Co.'s cottager's gas-cooking stove. The same firm have also taken a bronze medal for a high-pressure copper tubular gas boiler, specially designed for heating greenhouses, which is simply a reproduction on a small scale of the ordinary multi-tubular boiler, with the exception that the boiler, instead of being heated by a coal furnace, is heated by means of a terra-cotta gas-burner, perforated with small holes arranged on the atmospheric or Bunsen principle. The boiler is connected with the ordinary heating-pipes, and is sufficiently portable that it can be readily placed in any convenient corner, whilst the flue-pipe is also utilized for heating purposes. An improved application of gas in the place of the ordinary coal fire for dwelling-houses is also exhibited by the same firm. This is termed the asbestos gas-fire, and consists of a row of pipes with atmospheric gas-burners which can be fixed in any ordinary grate, and upon these are placed small blocks of asbestos, which on the gas being lit become red hot without consuming, and thus throw out a considerable heat with all the appearance of a coal fire.

Messrs. H. and C. Davis and Co., of London, have secured two silver and one bronze Corporation medal for gas stoves. The family gas kitchener, the chief feature in which is that it is entirely surrounded—back, front, sides, and top—with an effective non-conductor, and Bellaer's "Auckland" breakfast cooker, with kettle combined—a very handy little stove—have secured the silver medals, and their artizan cottage gas stove has been awarded the bronze medal.

Messrs. Beverley and Wylde, of Leeds, have obtained a silver medal for their "Leeds" patent gas kitchener. This stove is lined with white glazed tiles or fire-bricks, bolted on a plate of iron arranged so as to retain the heat given out by the gas burnt, whilst to prevent radiation the tiles or bricks are backed by a patent non-conductor, known as "slag-wool."

Mr. T. Marsh, of Oldham, has received a silver medal for a useful new invention which he exhibits for the first time. This is termed an "Ærorheometer," or gas-flow measure, and has been designed for testing instantly the quantity of gas passing per hour through burners, governors, &c. The instrument is intended to supersede the ordinary experimental meters, and is a small handy apparatus which can be readily applied wherever it is required. The instrument consists of a glass tube, with a glass rod, holding a perforated disc, running through the centre, and this disc is at once acted upon by the quantity of gas passing through the tube. Above the glass tube is a metal one constructed with great accuracy, and gradually widening out to the top; this contains a second disc, solid, and the higher this disc is forced up the tube the larger is the quantity of gas escaping. The instrument is only constructed to measure up to 12 feet per hour, but the results obtained were highly satisfactory, the quantity of gas passing through being indicated instantly, and there is no doubt it would be found very useful to gas managers for testing the consumption in street-lamps, &c.

Another new and useful invention to which a silver medal has been awarded is Fisher's arrangement for lighting and ventilating public and private buildings by gas, which was exhibited by Mr. James Howarth, of Manchester. This arrangement consists of a sun burner, much of the ordinary description suspended from the ceiling of the room. The outer rim of the burner is perforated with holes communicating with a zinc flue passing through the ceiling and the roof of the building. Inside this flue is a copper tube resting upon the top of the burner or reflector. This tube collects the heat from the burner, and being closed at the top, the hot air is passed out through perforations in the upper portion of the tube into the upper part of the flue, thus creating a strong upward current sufficient to ventilate the building. Several of these ventilators have already been applied with success to public buildings.

Silver medals were also awarded to the Lancashire Gas-Meter Company for their dry metallic governors (Borrodaile's patent) for street-lamps and domestic lights, which are already largly in use; to Mr. J. E. H. Andrew, of Stockport, for the well-known "Bisschop" gas-engine; and to Messrs. W. and B. Cowan, of Edinburgh, Manchester, and London, for Warner and Cowan's wet gas-meter.

Bronze medals were also awarded to the Lancashire Gas-Meter Company, for the "Falcon" gas-meter; to Messrs. J. Stott and Co., for Stott's patent self-acting gas-valve for the use of consumers; to Messrs. J. Wigglesworth and Son, for Gillingham's heat radiator; to Mr. John Busch, for Busch's well-known gas-governors; to Mr. Thomas Heron, for duplex gas-burners, globes, galleries, and coronets, complete; to the Patent Gaslight Company, for duplex gas-burners; to the Lancashire Gas-Meter Company, for the "Falcon" mercurial gas regulator; and to Mr. Thos. C. Marsh, for an equilibrium revolving governor for public lamps and chandeliers.

The Public Lighting of Sidmouth.—The *Western Times*, of Tuesday last, says in reference to this subject: "To the inhabitants of other towns the lighting of the street-lamps would appear a small matter and scarcely worthy of remark, but not so here, for when at the commencement of this week they were lit for the first time for nearly two years, the expressions of pleasure were numerous and emphatic. It will be remembered that at the commencement of last winter the Local Board determined to reject the tender of the Gas Manager, and to adopt a system of lighting by means of 'automatic' lamps, which ultimately proved not only a complete failure, but an annoyance to a large portion of our townspeople. Even when the lamps were burning properly, the light, compared to gas, was exceedingly dim; but that was not all, for generally nearly half the lights were either flickering or completely out before they had been lighted two hours. An increased demand for lanterns was the consequence, and all who did not provide themselves with these—at that time—exceedingly useful articles, were in danger of unpleasantly colliding with any obstruction that might be in the way. This was retrogradation with a vengeance, and the question was often asked, 'Do we live in the nineteenth or the fifteenth century?' and it was really difficult to realize that we were living in such a civilized and enlightened age. After enduring the darkness for some time, the inhabitants raised a protest against it, and petitioned the Local Board to remove the automatic lamps, and again light the town with gas. This petition was laughed at, and the ratepayers had to 'bide their time,' but ere long that time arrived. In March three members of the Board retired, two of whom (both having voted for the automatic lamps) sought to be re-elected. But the ratepayers had not quite forgotten the winter's darkness, and the certificate of the returning officer showed that these 'economizers' of public funds had not the sympathies of those whose suffrages they sought. Three gentlemen were therefore elected who were resolved to make the convenience and safety of the inhabitants their chief aim. The result is that a contract has been entered into with the Gas Manager to light the town for three years; the wooden lamp-posts, which by no means were ornaments to our streets, have been removed, and the lights are welcomed as a boon by the inhabitants, experience having taught them that darkness means inconvenience and danger."

THE DISTILLATION OF COAL TAR.

On the 9th of September last year application was made by Mr. G. C. Trewby, C.E., and Mr. H. W. Fenner, Manufacturing Chemist, both of the Beckton Gas-Works, for a patent for "Improvements in the Distillation of Coal Tar."

In the specification of their patent, which was sealed on the 2nd of March this year, the inventors say: "In the distillation of coal tar, as carried out up to the present time, the heat generally employed for the purpose is that obtained by external fire heat, and it has been found necessary to employ that heat at a much higher temperature for the elimination of the heavier products than their true distilling points, and for two reasons—1. The resistance offered to the escape of the vapours by the large proportion and depth of residual products contained in the still. 2. The bad heat-conducting properties of the said residuals. This excessive temperature so applied has resulted in the decomposition and loss of valuable products, together with an accumulation of coke on the surfaces of the still more immediately exposed to the action of the fire. In consequence it has been found necessary periodically to stop the stills in order to remove the coke so accumulated. When heavy tars have been worked this has necessitated a frequent renewal of still bottoms, and, together with loss of working capacity, has been a serious drawback to tar distillers.

"The object of the present invention is to overcome these difficulties, and the character of the agitation obtained continually renews the contact of the boiling tar or pitch with the surfaces of the still exposed to the fire, thereby preventing caking, and at the same time providing a force for the immediate expulsion of the vapours when they reach their true distilling point.

"It has been found by tar distillers, under the old system, impossible to use coke or other highly heating fuel, on account of the concentration of the heat in the bottom of the still; but in pursuance of these improvements this evil is obviated, and coke or fuel of any kind can be employed."

The annexed engravings are copied from the drawings accompanying the specification. Fig. 1 shows a vertical section, and Fig. 2 a horizontal section of a still, with parts arranged to carry the above-indicated improvements into effect, steam being employed at any convenient pressure.

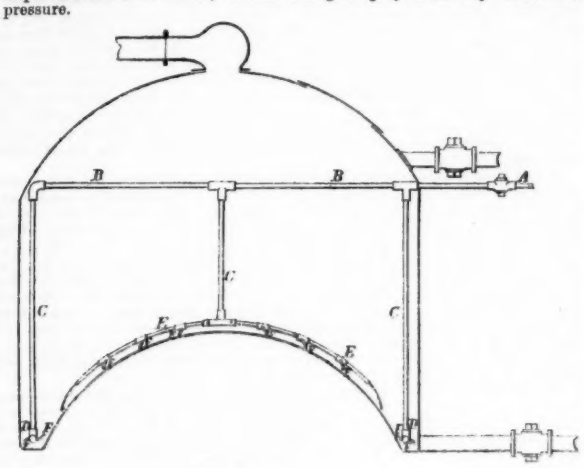


Fig. 1.

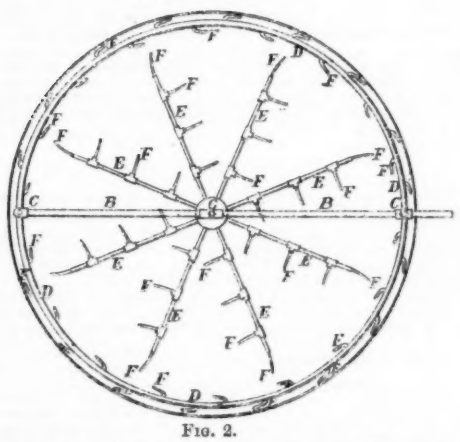


Fig. 2.

The manner of proceeding is as follows:—"The still is worked in the usual way by fire heat until the lighter products have passed over. Steam is then turned in by the cock, A, and is made to traverse the pipe, B, which is connected with the smaller tubes, C, C, C. The two outside lead into the ring, D, the centre into the branches, E, which again lead into numerous smaller outlet-pipes or passages, F. There are as many of these outlet passages employed as may be found desirable. From the pipe, B, the steam is distributed amongst the three columns or tubes, C, C, C, and by the ring, D, and thence by the branches, E, is again subdivided, ultimately striking the gutter and the crown of the still bottom by the outlets, F. The steam entering at A is, in fact, split up and so subdivided that it becomes, by its passage down the tubes through the vapours and body of the boiling tar or pitch, superheated to about the temperature of the tar or pitch, which, of course, renders all risk of boiling over impossible, whilst the increased pressure from the increased heat and expansion of steam causes intense agitation of the tar in the still, and the expulsion of the vapours with greatly increased rapidity. After the admission of the steam through the pipe, B, as stated, it is no longer necessary to increase the fire under the still, but merely desirable to keep it sufficiently alive to maintain the contents of the still at an even temperature, which may be seen by reading a thermometer placed in a tube on top of the still, the end of the tube inside the still being closed."

SANITARY INSTITUTE OF GREAT BRITAIN.

At the Congress of the Sanitary Institute of Great Britain recently held in Exeter, two papers dealing specially with the subject of water supply were read before the Geological and Meteorological Section. Though they refer more directly to the local than the general bearing of the question, they possess sufficient interest to justify their reproduction, with the discussions thereon, in the pages of the Journal.

The first paper was by Mr. T. Andrew, F.G.S., one of the Vice-Presidents of the Section, and was upon the subject of

THE GEOLOGY OF EXETER IN RELATION TO THE WATER SUPPLY OF THE CITY.

In consequence of an alleged insufficient supply of water from its source in the Exe for the city of Exeter, the Corporation, about 2½ years ago, purchased the water-works from the Company in order that such alterations and additions should be made as might be from time to time considered necessary. Since then the possibility of a sufficient subterranean supply has been frequently discussed in the local newspapers. It has been argued that inasmuch as Exeter is on the new red sandstone, an undoubted supply of very pure water, enough for drinking purposes, might be obtained; that is to say, enough for the wants of from 45,000 to 50,000 persons. The purpose of this paper is to raise the question among scientific men as to the probability or improbability of so much water being obtained by boring within the city or its environs.

Of course, all subterranean water must have, at some time or other, percolated through the cracks and rents of the surface rocks, and the quantity of water must largely depend upon the surface configuration of the locality. A flat surface is more likely to retain the water than rising ground. Remembering that Exeter is on a tongue of land, and, except towards the east, is surrounded with valleys, it may be fairly assumed that more than the average quantity of rain water finds its way to the sea. An authority on these matters stated at a recent meeting of the British Association that probably one-third of the rainfall entered the rocks. But I question very much if such a proportion will be found in the rocks of Exeter. Necessarily, any computation as to the proportion of 30 inches of annual rainfall entering its rocks must be hypothetical. It will also be remembered that the inclination of the beds from or towards the city will be an important factor, as water usually works its way along the plane of the beds. I have known instances of well water being abundant on one side of a valley, and none to be met with at similar depths on the other side.

Reference to a geological map will show that Exeter is in part on carboniferous shales, in part on the trap, and also on the new red sandstone. During the formation of the shales, and most likely towards the close of the carboniferous period, the whole of this neighbourhood, and more or less from Dartmouth to the Land's End, was greatly exposed to earthquakes and volcanic eruptions. De la Beche says: "The whole of the slates and sandstones are intermingled with the Trappean in a way to show that there must have been considerable igneous action, during which ashes and vesicular lavas showing little pressure were ejected contemporaneously with the deposit of the slates and the sandstones." This authority here more particularly refers to the district between Dartmoor and the Land's End; but it appears that a similar volcanic action characterized the termination of the shale period in this locality. Between Exeter and Dartmoor are several volcanic vents, and everywhere in this locality the shale is contorted and torn in almost every conceivable manner. I might also observe that in an important section of the new red sandstone in the Heavitree Quarry the cleavage joints are for the most part so filled with carbonate of lime as to render it impossible for water to find its way through them. Hence the action of springs in that quarry.

Exeter, geologically, may be divided into several areas, as follows:—

1. From the South-Western Railway Station to the bottom of Exe Lane, along what was formerly the Brook; then around the Princess Road to Fore Street Hill; and thence by Fore Street Hill to the West of England Insurance Office, an area will be described which has a stratum of clay from 2 feet to 4 feet thick, of a yellowish colour, and very tough, and beneath the carboniferous shale, commonly called shillet, to a considerable depth. My friend Mr. Parfitt, of the Devon and Exeter Institution, has kindly supplied me with the notes of a boring at St. Anne's Well Brewery, commenced in March of last year. This well will be found situated about midway between Queen Street Station and Exe Lane, and before the filling up of the valley for railway purposes was on the "nap" of the hill descending to the valley. The boring commenced in the shillet, and only reached water at a depth of 305 feet, and then only in quantity not much in excess of the requirements of the brewery. Mr. Parfitt has also furnished me with the notes of a boring of a well for the City Brewery in 1849. At a depth of 15 feet the boring was through water gravel, then for 85 feet through the shillet, for 54 feet more through alternate layers of trap and red shillet, then for 90 feet through blue shale, for 3 feet through water sand, and for 23 feet more through blue shale, making a total of 270 feet. This great depth was necessary in order to obtain water, and, although in a valley, you will perceive is not much less than the number of feet necessary to be bored for the St. Anne's Well Brewery. In digging wells in this rock, the depths at which water is obtained differ very extraordinarily. A well has a fairly good supply at a depth of 9 or 10 feet in one place, while others not 20 yards off had not had water at less than 50 or 60 feet, and in the cases of the St. Anne's and City Brewery wells an approximate depth of 300 feet had to be reached. This will probably result from the presence of numerous faults, or slides of large masses of rock, from various causes, but mainly volcanic. A very good section of this rock may be seen in the Princess Road, close to Head Weir.

2. If another line be drawn from Gandy Street up High Street, along Longbrook Street, and then descend to the bottom of the street and follow the line of the ancient brook to the South-Western Railway Station, it will be found to encircle the igneous rock on which the Castle of Exeter stands. The least exposed portion of this rock is very compact and ponderous, and when a portion of the base of the hill was cut away for the South-Western Station, it was thought that the stone was sufficiently hard for the bridge which spans the railway near the prison; but after a few years of exposure the stone softened and gradually crumbled away. It has a granulated, or small grainy and purple ground, sprinkled with minute shining points. It has numerous fissures crossing in all directions, or filled with white hard veins of calcareous spar. After long exposure, this stone degenerates into a red clay, and this clay composes the surface of the Castle Hill, from whence no doubt this eminence derives the name of "Rougemont." This, it must be remembered, was a volcanic rock, and was probably thrust up at the close of the carboniferous period, which may account for the very broken and disturbed condition of the surrounding shillet.

3. From St. Stephen's Bow to St. John's Hospital, including Bedford Circus, the stratum is of sand and gravel; this is followed by clay, mixed with small masses of the disintegrated rock of the Castle, and the masses becoming larger and more compact soon form a rock of the same kind The wells in this area are from 20 to 30 feet deep, and give excellent water

The well water of this locality is far preferable to that of the shale; but immediately beyond the Circus, or Southernhay, we find water certainly unfit for domestic use. In a well behind my own house, in the middle of Southernhay, the water was declared by the City Analyst some twelve months ago to be unfit for domestic use. I have been unable to trace the cause of the presence of so much ammonia in this water.

4. Above St. John's Hospital and Longbrook Street, the second stratum is a fine red sand about 60 feet thick. Under this, in some places, is a bed of soft marl from 4 to 6 feet deep, and then again the red sand. The sand extends all over St. Sidwell's to the old Tiverton Road turnpike-gate. The soil of the adjacent fields has been for a century and upwards used by the brickmakers. But in this area of the new red sandstone there is less water than might be supposed. At Lion's Holt there has been a very fine spring from time immemorial, and although it comes through the thin bed of the Trias at that place, I have been long in doubt whether it really came from the new red sandstone or from the shale underneath. At Polsloe Road the wells are from 20 to 30 feet deep, and yield an average supply of water, but, so I am told, not much in excess of the wants of the owners thereof. Mr. Hitt, of Heavitree, told me a few days ago that there was a well 100 feet deep in the new red sandstone at the corner of the road leading from Magdalen Road to the Barnfield, and, although at so great a depth, there was scarcely any water.

5. But to be more comprehensive it may be briefly stated that a line drawn from Taylor and Bodley's iron foundry, in Commercial Road, to Lion's Holt, thence to the Black Boy turnpike-gate, will describe the boundary line between the shillet and the Trias. In other words, the half of the city on the north and west sides will be altogether on the shillet, and that on the south and eastern portion will be on the new red sandstone; but, necessarily from its conjunction with the shale, there will be no considerable depth of new red sandstone except at some distance from the city.

My conclusions are—1. That in and around Exeter natural underground basins for the collection of water are not likely to be met with, and that the improbability is rendered greater by the presence in the very heart of the city of an extinct volcano, which has considerably upheaved the beds, and broken them in almost every conceivable variety of manner. 2. That the depth at which water can be obtained in the shale—indeed, the finding of water at all in any large quantity—is so uncertain as scarcely to justify the expenditure necessary for an experiment. 3. That the new red sandstone on the south-eastern side of the city being so thin, and the surface configuration of this part of the city unfavourable to the collection of a large quantity of water, I am unable to believe that water in anything like a large supply can possibly be obtained at a nearer point than the lower part of Heavitree, about 1½ miles from the centre of the city.

Mr. Martin, C.E., said that, as a citizen, he desired to say that they ought to feel greatly obliged to Mr. Andrew for the light he had thrown on the subject. They had been reminded from time to time that there was a report by a distinguished hydraulic engineer which recommended them to search for water immediately under their feet. That report had not been published. He thought it a pity that they should be so often reminded of this without their knowing its tendency. He quite endorsed the remarks as to the supply of water at Lion's Holt. Mr. Andrew did not say in direct terms, but left his hearers to infer that the water issued from the carboniferous mass, and simply oozed out through the new red sandstone in the lower part of the valley. He had under consideration the boring of a deep well at Teignmouth, and on making inquiries as to the boring of wells, he was surprised at the result. Two cases were mentioned by Mr. Andrew. At Exminster the boring was made in the new red sandstone, and then they had to go a great depth into the carboniferous shale. He mentioned the depths of the wells in several places to show to what extent they had to bore—viz., at Exminster, 473 feet; at Crediton, 246 feet; at Silverton, 257 feet; at Topsham, 220 feet. If they had to go to such a great depth they would have to pump at considerable cost. They were told from time to time that there was abundance of water at Lion's Holt to supply the city. People imagined that because there was water upon the surface there was an inexhaustible supply underneath. Some time ago he was asked to go to Marypole Head and report as to a supply, a report having been published stating there was an abundance of water on the top. He went, but declined to report, as there was not enough water to report on. There was just enough there to flow through an inch pipe.

Mr. Parfitt said they must bear in mind that from the River Exe, extending about 1¾ miles in an easterly direction, was the collecting-ground of the water, broken up by geological faults, and he was certain that it would be impossible to collect from it sufficient water to supply Exeter. Just below Polsloe Farm there was a very thin layer of the new red sandstone, over the carboniferous; it lay along the whole of the valley cut by the South-Western Railway. Two gunshots beyond that there was a cutting, where the brook had cut its way down to 30 or 40 feet, and this showed that it was "faulted" against the carboniferous. It held the water in this particular place for what was called St. Anne's Well. There was no other place where there was anything like a supply for a large city. At Heavitree Brewery the well was 375 feet deep, and as it did not yield a sufficient supply it was intended to sink it to a depth of 400 feet, to ascertain if it would yield more water. In his opinion, the ground all round about Exeter, within the collecting area, with a diameter of about two miles, was so "faulted" that it was not likely that water would be obtained from it in sufficient quantity for the city of Exeter.

Mr. Bodley had been told that in Exeter they had an imaginary supply of water immediately beneath their feet; but, having been engaged in connection with the large pumping-wells in the neighbourhood, he could refute that piece of imagination. The local paper makers, in an endeavour to compete with the Kent makers, tried three wells at Exeter, but the water was unsuitable for paper-making. At Huxham and Heavitree wells were bored with the same result. At the Lunatic Asylum at Exminster there were wells 114 feet and 120 feet deep. In that neighbourhood the wells did not supply anything like the quantity of water they were supposed to do. As to the St. Thomas's water supply, the well there first went through the top soil, then through 9 or 10 feet of gravel to the shillet. No water was obtained from the shillet; all that was obtained was from the gravel—a quantity so small as to be inappreciable. It was foolish of the citizens to attempt to sink a well—unless, indeed, they went to an enormous depth. There was no percolation through the shillet from which they could get the water. At the brickyards a sufficient supply of water could not be obtained from the wells to saturate the clay for making into bricks.

Dr. Carpenter said that the water he had had since he came to Exeter had been very good, so far as its appearance went, and he should be satisfied with it; and he understood that this was obtained from that natural source, the collecting-ground which Nature had provided for the city of Exeter. The citizens of Exeter would not have far to go for a water supply, for Nature had provided them with a collecting-ground in their neighbourhood, the overflow of which went into the river. It was very wrong of the Authorities to allow such rivers to be defiled, as they ran from their pure source. It was morally and criminally wrong on the part of any Local Authority to pour into those rivers the sewage of their towns in the unpurified state in which it was poured into their rivers, and as he knew that it was poured into the river at Exeter. They should compel the Authorities in the higher part of the district, at well as those nearer Exeter, to refrain from polluting the river, and then there would be an abundant supply of good water. Providence had some other object in providing rivers than, as a gentleman once said he regarded them, for the supply of canals, or to build towns upon. The rivers never failed, and were provided for our supply of water; and the lake districts were intended to provide for the great centres of population that which they want—pure water. If the law were carried out properly, there would be no deficiency in the water supply for the city of Exeter.

Mr. R. Rawlinson, C.B., said this was essentially a local question. Whether water could be obtained in sufficient quantity from wells could only be tested by the fact of its being obtained. It was no use to speculate, geologically or meteorologically; and after the evidence they had heard it was not very encouraging for them at Exeter to go into a large expenditure in the endeavour to get a water supply from wells. Liverpool and Manchester, once supplied from this source, had had to give it up and go beyond. Wolverhampton had had to go outside and get water *plus* the wells. Birmingham had also had to supplement its wells. New York had had to do the same. Many persons were so stubborn that no one on earth would be able to convince them to the contrary if they had once got it into their heads that they had only to sink a well and get water—leading Town Councils into expenditure because they would listen to neither rhyme nor reason. They declared that water could be had, and they induced Town Councils to expend money because they thought that the water ought to be obtained. It was important that Exeter should not be led into error. Some people said, "Go deep enough, and you are sure to get water." Those gentlemen showed that they knew nothing of the crust of the earth. In Yorkshire there were mines of from 1000 to 2000 feet in depth, and he did not know any mine exceeding 1000 feet deep which did not go below the water-bearing strata, so that they had to send down water to water the subterranean roads. Bath stood upon the oolites, and its hot water was obtained from their stratification. Buxton and Matlock stood upon the limestone. All limestones were fissured. Rain was the purest water, and it filtered into the cracks or fissures, combined with the lime, and took away the bicarbonate, until ultimately they had the surface water, after descending in a syphon to perhaps 5000 or 6000 feet, coming up to the surface. There was nothing magical about it. If they attempted at Exeter to get water from the new red sandstone, they would fail; as, judging from the geological "dip," it all went away, although he could not say where it went. But there must be places, not very far distant, where they could get a good supply, if the river was not satisfactory. He would recommend the Town Council, before expending any money on well-sinking, to obtain the Sixth Report of the Rivers Pollution Commission, which contained more information on wells, well-boring, and analyses, than any he knew, and they might study it with great advantage.

Mr. Symons said Mr. Rawlinson had epitomized for them the experience of other places. Some people liked to buy their experience, but he advised Exeter not to do so. No matter how much sewage might be purified, he did not like the idea of drinking the water after it came from a sewage farm. He should infinitely prefer going to those glorious moors, and taking the water, which was perfectly pure, only tinged with a little peat, which was absolutely harmless. Whatever engineer might be employed, he would be to a great extent blindfold if he went to Dartmoor without ascertaining the rainfall, while the expenditure of a small sum, perhaps £20, would supply the requisite meteorological data, and might save the expenditure of thousands of pounds.

Mr. Grantham said he had just completed some well-borings in the tertiary, in the endeavour to get down to the greensand, under the supposition that he would get a larger and better quantity of water than from the chalk. In boring it was found that the sinkers completely tubbed out the vein which contained the water in the chalk. In Devonshire it would be almost impossible to calculate where water would be obtained from subterranean wells; and to find such a geological formation to be supplied with subterranean wells was not to be expected. The Dartmoor supply, if it could be had, would be a very simple thing.

Mr. C. Fox suggested that if Dartmoor could supply Plymouth, certainly it should supply Exeter. He also recommended the perforation of Haldon.

The President, as a geologist, had no hesitation in saying that the author of the paper was abundantly justified in the advice which he had given. Strata like those at Exeter could not have a water-bearing power. If the Exe were purified as Nature made it, there would be no difficulty in the supply of water to the city.

The Mayor of Exeter, in moving a vote of thanks to Mr. Andrew, said that it was fortunate for the citizens that the discussion had been raised. After the opinions expressed by Mr. Rawlinson and Mr. Symons, instead of wasting time on impracticable schemes, Exonians should now set to work and call upon the towns on the banks of the Exe to stop the flow of sewage into the river.

Mr. Andrew, in acknowledging the vote, remarked, as to the suggestion that Haldon should be perforated, that he did not believe it would be advantageous, judging from the surface configuration.

The President observed that there was a supply of water on the west side of Dartmoor, and he had very little doubt that there was a similar supply on the east side, which he should recommend to be tried.

The other paper was on the subject of

ORGANIC IMPURITY IN THE WATER OF THE EXE,

the author being Mr. F. P. Perkins, the Public Analyst for Exeter. In the course of his paper, the writer dealt with the amount of organic impurity contained in various samples of the water of the Exe taken at certain points in its course from Tiverton to Exeter. Commencing with a few remarks thanking the City Surveyor (Mr. H. P. Bulnois) for his kind co-operation in furnishing samples of the water for analysis, Mr. Perkins continued as follows:—

Starting a mile above Tiverton, I find the water of medium purity, requiring 0·0718 parts of oxygen to oxidize its organic matter. About 100 yards below Tiverton, after the water has been polluted by the sewage of the town, and has passed through the mills, the amount of oxygen absorbed is—as might be expected—larger, being 0·0873 parts. At two miles below the town it is still more polluted, and the amount of oxygen it now takes is 0·0929 parts. After flowing over a stony bottom, and just above Bickleigh Bridge, in still water with plenty of weeds, I find the organic matter considerably reduced; the proportion of oxygen consumed being 0·0738 parts. Passing on to that taken below Bickleigh millstream, the amount of impurity again increases; for the quantity of oxygen required is 0·0859 parts. But the cause of this is at once apparent. The water of the Dart, which flows into the Exe about one mile above the place from which the previous specimen was taken, is very foul, requiring not less than 0·207 parts of oxygen for the oxidation of its organic matter. The water now passes over a gravelly bottom, and ripples over natural weirs, and at Bourne Mills, just below the junction of the Bourne, the

water becomes much improved in quality. At Thorverton it appears to be again slightly fouled, but recovers itself by the time it reaches Netherexe, after flowing over a weir. At Stoke railway bridge the river is much deeper, and is not quite so pure.

There are two points gained in this examination—1. That were it not for the dirty River Dart, the water supply of Exeter would be much better than it is. 2. That Nature's process of oxidation, as carried on in rivers, is, under favourable circumstances, anything but slow. Let but the water tumble over a weir or ripple along a stony bed, or let there be an abundant growth of plants, and we find even in a short course a great change for the better. This is well illustrated in the flow of the river from the Dart to above Thorverton, where the bed is rocky. Even at Tiverton, after the water is churned up by passing through the mills, it must come out purer than it went in; for water taken at the point where the sewage is delivered into the river would be much more contaminated. In the deeper parts of the stream, oxidation seems not to be so rapid.

No laboratory experiment, however skilfully devised, can ever approach Nature's process. Here is a river, open to the air, and subject to the variable yet constant action of heat and light. The supply of air is unlimited, and changing momentarily; every breeze that is wafted over the surface of the river bringing the purifying oxygen in contact with the effete matter, and every ripple showing its decomposition. The constant evaporation from the surface, and the continual molecular change that thereby ensues, must be the means of breaking up organic compounds, and also aid materially in purification. The old saying, then, that "running water purifies itself," is true; but for rapid purification the water must be brought into close contact with the air or with oxygen.

I conclude these notes with the remark that, although the Exe is not perfection, it is not the sewer that some imagine it. As it is, it bears favourable comparison with any of the rivers of the kingdom; and when its water is carefully filtered it reaches a high standard of purity.

Mr. H. P. Bulnois said he desired to add a few remarks to Mr. Perkins's valuable paper. The samples of water to which Mr. Perkins referred were taken by him (Mr. Bulnois) on the 16th of August of this year, the water in the Exe being abnormally low. In taking the samples, he noted the velocity of the flow of the water, the character of the bed of the river, the appearance of the water, its depth, and other particulars, which he would describe. The samples were all taken from as near the centre of the river as possible, but, unfortunately, he had no appliance with him for registering the temperature of the water. The fifth sample referred to was taken from a stream called the Dart, near its junction with the Exe at Bickleigh Bridge, its velocity at this point being at the rate of 3·2 feet per second, its depth 6 inches, the bottom, which was of a gravelly, stony nature, being covered with a slimy dark deposit or vegetation, giving to the water a grey, dark hue. This description gave an idea of the appearance of the stream and of the small rivulets joining it for about three miles above the confluence of the Exe. This stream rose on Gibbet Moor, on the outskirts of Exmoor, and close to it rose the Little Dart, which flowed westward; but both these streams were quite distinct from the well-known River Dart, and not to be confounded with it. The stream from which the sample in question was taken flowed S. and S. by E. till it joined the Exe. It passed exclusively through a pasture land apparently, on referring to the Ordnance map, and could not receive any amount of contamination from dwellings sufficient to give it the bad character Mr. Perkins had assigned to it, no populous place being in its vicinity. The presence of such an excessive amount of organic carbon must, therefore, be due to peat. He had not yet had an opportunity of inspecting this stream throughout its entire length, but he should now be tempted to do so after hearing Mr. Perkins's paper. With reference to an attack that had been made on the water supply of Exeter by Dr. Bankart, who complained of the source from whence the water came, and that Tiverton drained into the Exe, the paper just read, he thought, clearly disproved by actual fact that the water of the Exe, as supplied to the inhabitants, was as pure as it could possibly be expected to be. There was no doubt that a large comprehensive gravitation scheme for bringing water from either Exe or Dartmoor would be a great thing for the city, but it would probably cost over £100,000. With reference to the question of a constant supply, he, and he believed the whole of the Town Council, were anxious to see this boon granted to the city; but the matter to a certain extent rested with the citizens. In some districts he had discovered waste to the extent of 75 gallons per head, and it was impossible to give a constant supply of water while this waste continued. Bye-laws, however, had been prepared to meet the case, and only needed confirmation; but he was afraid this could not be done until the Town Council were ready to give a constant supply, which they could not do until the waste was stopped.

A Novel Object of a Flower Show.—On the evenings of the 24th and 25th ult., a flower show was held in the Low School Room, Galgate (Lancs.), with the object of obtaining funds to assist the Galgate Gas Lighting Association, which has for its object the erection of lamps for the better lighting of the village in the winter months, in prosecuting its labours. Already 13 lamps have been supplied through its instrumentality.

The Salford New Sewage Works.—On Thursday last a party of members from the Manchester Scientific and Mechanical Society paid a visit to the new sewage works which are being constructed at Modewheel Weiste, by the Salford Corporation. The works, which will ultimately cost about £50,000, are being constructed for dealing with the sewage of the borough, which is at present emptied direct into the River Irwell, and have been designed by the Borough Engineer, Mr. Jacob. The process adopted is precipitation through a series of large tanks, by means of lime, one ton of which is used to every million gallons of sewage. The visitors were able to inspect the arrangement of the precipitating-tanks which are now nearly completed. These tanks are constructed of concrete, of which there are about 14,000 cubic yards, and are capable of holding 5 million gallons of sewage. The works are being constructed to deal with the sewage from an area of about 14,000 acres, and the minimum quantity to be dealt with during dry weather will, it is estimated, be about 7500 gallons per minute, whilst the maximum may reach to about 18,000 gallons. The sewage, after being strained, will be received in pump wells, from whence it will be passed to the mixing-house, where it will be thoroughly mixed with lime, for which purpose a couple of engines of 320-horse power minimum will be employed. The sewage is then conveyed by 13-inch pipes to the tank farthest from the engine-house, where the impure matters are gradually precipitated, and the contents of one tank as it becomes full flow into the next. The solid matter after settlement is conveyed into pits to dry, and will be afterwards supplied to farmers for agricultural purposes. The pure water is received into a channel, along which it passes to a chamber where it develops sufficient power for working a couple of turbines, and it is also proposed to work also with it hydraulic machinery, which will be employed to load barges with the proceeds of the sewage. After this it is allowed to pass into the river. The visitors were conducted over the works by Mr. Mestayer, the Deputy Borough Engineer, and Mr. Pilling, jun. (Messrs. Pilling and Son, of Bolton), one of the contractors.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The leading event of the past week in connection with gas affairs in Scotland was the opening of the Exhibition of Lighting and Heating Apparatus, &c., under the auspices of the Philosophical Society of Glasgow, the formal ceremony having been performed last Tuesday, by Lord Provost Collins, in the presence of a very large and influential gathering of citizens. As descriptive notices of the exhibition will appear in other columns of the Journal, it is not necessary that I should enlarge upon the subject in these brief "Notes." It will suffice if I simply say that the collection of exhibits is one of a most extensive, varied, and interesting character, and that it is scarcely probable that even the most sanguine promoters of the undertaking had any expectation of its turning out to be such a magnificent success as it has already proved to be.

Another event of importance was the half-yearly meeting of the West of Scotland Association of Gas Managers, held at Port Glasgow on Friday, under the presidency of Mr. Carlow, the Manager of the Corporation Gas-Works of that town.

There are already indications of the return of the annual elections to the Town Councils in Scotland by the appearance of the present members of the Councils before their constituents to give an account of their stewardship. In such cases gas affairs are not unfrequently made the subject of remark by the municipal representatives and by the electors. At a meeting of the ratepayers of one of the Glasgow municipal wards with their representatives on the evening of Friday last ex-Bailie Walls, the Convener of the Corporation Gas Committee, whose term of office is about to expire, was the leading speaker, and in the course of his remarks he made gas matters the first subject to dilate upon. He said that he had recently in the Town Council gone into minute detail as to the working of the town's gas affairs since 1870, when the Corporation took over the gas-works. The difference between the first year and that which closed in May last was very marked. He repeated the figures which he gave at the Town Council meeting, and said that the highest price which the gas had reached since it came under the control of the Corporation was 5s. 5d. per 1000 cubic feet, whereas the price was now reduced to 3s. 8d. The total saving to the consumers had been £42,400 per annum. It was important to keep in mind that every penny that was taken off the thousand feet of gas reduced the rates 1d., that was to say, if 2d. per 1000 cubic feet was taken off the price, it was equal to a reduction in the rates of 1d. per £1 of rental.

A meeting of the Gas and Water Committee of the Inverness Burgh Commissioners was held last Thursday—Provost Mackintosh presiding—when a statement in reference to the gas accounts was submitted by Mr. Hay, the Treasurer. Having enlarged upon the ways and means for the ensuing year, he suggested that the price of gas should be reduced from 7s. 6d. to 6s. 8d. per 1000 feet—a reduction of 10d.; and on the motion of Mr. Jonathan Ross, seconded by Mr. Burns, it was agreed to recommend that such a reduction should be made, which it was considered could be safely afforded, as it left a good margin for any contingency.

The annual general meeting of the Whitburn Gas Company was held last Tuesday—Mr. R. Gardner, Chairman of the Company, presiding. A statement of the income and expenditure of the Company for the past year having been submitted and considered satisfactory, it was resolved that a dividend at the rate of 5 per cent. per annum should be declared.

The supply of gas and water to the town of Ardrossan is in the hands of a private Company, known as the Ardrossan Gas and Water Company, and as a number of people in the town think that both should pass into the hands of the Police Commissioners, a public meeting was held last week to consider the propriety of asking the Burgh Commissioners to open negotiations for the purchase of both undertakings. After a good deal of discussion an amendment was carried, asking that the Commissioners be empowered only to take action in respect of the water supply, the question of the gas-works being held over in the meantime.

On Monday of last week business was done in the stock of the Edinburgh and Leith Gas Company at £35 per share, and on the following day at an advance of 10s. per share.

The contractor for laying the water-main from the Dodburn, for the town of Hawick, has begun operations, and work will be vigorously proceeded with. Meantime, Mr. Gale, C.E., of Glasgow, has been employed by the Committee of the ratepayers, who, in public meeting, urged inquiry on the Town Council to desist from carrying out the Dodburn scheme. Having examined the source of the Dodburn, as also the sources at the Allan, which the Committee consider preferable and more economical, he has reported that he considers a sufficient supply, at the required elevation, could be had cheaper from the Allan than from the Dodburn.

An enormous business was done in the Glasgow pig iron market last week, and a rapid advance in prices took place. As high as 50s. 9d. cash was paid on Wednesday, and at the close on Friday the price was down to 50s. cash.

The coal market is still slow as regards business. House orders are scarce and small, but for shipping there are a few more inquiries. Prices remain low.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The only change which has taken place in the coal trade of this district during the past week has been a slight upward movement in certain classes of coal. The principal colliery firms in the Manchester district have, following their usual practice, this month advanced their delivery rates to consumers 10d. per ton, and the prices at the local wharves and railway sidings have generally been put up to about the rates which were ruling prior to the reduction in July, which represents an advance of about 5d. per ton on some classes of round coal. Outside of Manchester, however, there is no material alteration. The demand for the better classes of round coal, although certainly improving, has not yet increased to such an extent as to warrant any general advance in pit prices, but there is a tendency to harden where sellers have been taking exceptionally low prices to secure orders. Indeed, the available supplies in all the principal colliery districts are so large that there is no probability of any materially higher prices being obtained, at least for the present. Common coals for ironmaking and steam purposes still move off moderately, with little variation either as regards prices or demand. Engine classes of fuel are held firmly as a rule for late rates, and the continued small supply of slack is a proof of the comparatively limited quantity of round coal at present being screened. Best Wigan Arley is in some cases quoted at 8s. to 8s. 6d. per ton at the pit; but good qualities are obtainable at 7s. 6d. to 8s., and common sorts and Pemberton four-feet average about 6s. to 6s. 6d. per ton; common Wigan mines for steam and forge purposes range from 4s. 9d. to 5s. 3d., burgy from 3s. 9d. to 4s. 3d., and good slack about 3s. to 3s. 6d. per ton.

A fair quantity of coal continues to be shipped from Liverpool, but shipping orders are taken at very low figures, steam coal delivered at the high level being obtainable at from 6s. to 6s. 6d., and other sorts from 7s. to 8s. per ton according to quality.

In a few cases the pits are now working rather better time, but in

most of the large districts the average is not more than about four days a week.

In the iron trade business has been extremely dull during the past week, no orders of any importance being reported in the market. So far as Lancashire pig iron is concerned, prices are only nominal, makers being open to offers, and in the finished iron trade there is an easier tone, as many of the local forges are now getting short of work. For delivery into the Manchester district bars can be bought readily at £6 per ton, and some sellers would take less.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The local coal trade, though somewhat slightly improving, is still comparatively dull, and the winter contracts are not of an extensive character. The past week's markets were well attended, and a more cheerful aspect prevailed. A few of the pits are well employed in drawing fuel for iron-making purposes, otherwise the majority are only partly employed. At the pits of the Earl of Dudley an increase of 10 per cent. is reported for the past month. Prices are, on the whole, far from being satisfactory. Forge coal is being sold as low as 7s. 6d., and slack at 2s. 6d. per ton. Gas coal is in better request, and coke is also more inquired after. The drainage difficulty is still a matter of anxiety, and in some cases the heavy rates are a drawback to successful mining operations.

The iron trade in most respects remains unchanged. Prices are firm, and for a few qualities slight advances are asked. The new sliding scale has proved that makers have been trading on worse grounds than was believed. This much has been demonstrated by the results of the first examination of the books of the twelve selected firms. The average price obtained for bars for the months of June, July, and August has only been £6 19s. 8d. Therefore, in accordance with the sliding scale, the wages of puddlers will be reduced by 1s. per ton, and mill-men 10 per cent. for the next three months. Masters must consequently have been selling at about £2 per ton below list prices. With a view of bringing about a greater degree of uniformity in prices, a meeting of sheet-iron makers was held at Birmingham on Thursday last. Representatives from most of the largest rolling-mills in the district were present, and a resolution was passed by which the makers of the South Staffordshire and adjoining districts form themselves into an association for the purpose of securing a more even rate of charges, and to maintain the relative prices between the different gauges. It is now pretty generally understood that little or no alteration will be made in the present rate for the incoming quarter; nevertheless, buyers will in most cases withhold the placing of orders until the arrival of the quarter-day meetings. Last week's markets were regarded as quiet, all transactions being of a limited character. Makers, however, are very confident as to the future, and preparations are being made for further development in the number of furnaces. Common cinder pig iron is still as low as £2, while part-mine averages £3, and hot-air all-mine about £3 5s.; sheets, singles, and fine, at £8; and marked bars, £7 10s. to £8. Unmarked brands realize £6 10s. to £7. For the miscellaneous kinds, such as hoop and strip, there is a fair market, and prices are firm. The girder and bridge ironwork trade is tolerably good, and at several of the foundries there are sufficient contract orders in hand to last the hands well into the winter. The export trade in this department is considered to be improving.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Advices received from London and other markets go to show that a better tone pervades the coal trade in many parts of the South Yorkshire district. This it is believed arises in a great measure from the fact that some of the pits are likely to issue advanced price lists, as they usually do at this season of the year, so that any permanent improvement is doubtful. Some of the leading merchants in the Eastern Counties have during the past week or ten days been forwarding a liberal supply of waggons; a thing they have not done for some time past. The Metropolitan trade has also increased, but it is doubtful whether any material increase can be sustained in prices, the output of the district being so large. The pits in the Wombwell Wath and Mexborough districts are working very fairly, and those at Dodworth belonging to the Silkstone and Dodworth Coal and Iron Company and the Strafford Colliery made five days last week.

The steam coal trade is rather on the wane, owing to the export season becoming advanced. Many of the largest pits where the coal is of good quality are doing a heavy trade with Hull by both rail and water; but the tonnage forwarded to Grimsby has not been so large during the past fortnight, and hence the exports are showing a marked decline. A fair tonnage of the same class of fuel is being sent to Goole and Hull from the West Yorkshire collieries, the former port being very accessible to the collieries in the Normanton and Leeds districts.

About an average quantity of both gas and locomotive coal is being supplied from the pits in both parts of the coal-field, chiefly on account of contracts entered into early in the year, and in some instances prior to that. Several of the Railway Companies are drawing large supplies from various collieries; but the prices at which the contracts were placed were so moderate that the owners have to depend on other sales for a profit.

The coke trade is undoubtedly the most profitable adjunct just now pursued in connection with mining operations, and it is satisfactory to have to state that notwithstanding the vast and increasing output which daily takes place in various parts of the district, business remains pretty active. Perhaps in no branch of the trade has there been a larger outlay than in the coke trade. With a view of competing with North of England manufacturers, large sums of money have been, and are still being, expended in washing and crushing machinery, so that some splendid coke is made. The demand for North Lincolnshire continues large, and as two or three new furnaces are likely to be blown in shortly, business is likely to increase.

The labour market throughout South Yorkshire is still greatly disturbed by disputes of various kinds. Coalowners are compelled to demand reductions of wages, as the pits are not paying, so that to work them on at a loss is almost out of the question. At the North Gawber Hall Colliery the Directors propose to pay, as far as possible, solely on the tonnage. The prices they offer, the men allege, show a reduction, and they have resolved not only to reject the new list, but to demand an advance of 12½ per cent. which they conceded last year. The scheme for amalgamating the three unions has practically collapsed.

SALE OF SHARES IN THE READING GAS COMPANY.—On Monday, last week, Messrs. Cooper and Son offered for sale, by public auction, in Reading, 700 new 7 per cent. shares in the above Company. The whole of the shares were disposed of at a good premium, the highest price realized being £14 12s. 6d. per £10 share, the majority of the lots being sold at £14 10s.

BURSTING OF A WATER-TANK AT THE CRYSTAL PALACE.—Last Thursday afternoon one of the large water-tanks standing in the north-west portion of the grounds of the Crystal Palace, and used for supplying the fountains, suddenly burst with a loud report, leaving an aperture fully 16 feet square, through which the water rushed in a flood. Parts of the tank weighing several hundredweight were carried to a distance of 250 ft. The tank was 48 ft. by 48 ft. by 20 ft. deep, and was connected by a large pipe to a similar tank close by. Both are composed of cast-iron plates, each 8 ft. by 4 ft., and 1 in. thick, riveted together by strong bolts, and further strengthened by diagonal bars in order to resist the great strain at times put upon them. At the time of the occurrence the engines were engaged in pumping into these tanks a sufficient supply of water for the fountains during the fire-work display to take place in the evening. When the breakage took place they had about 1800 tons of water in them, and before the valves separating them could be closed, about 1400 tons, or over 300,000 gallons of water, had been emptied upon the ground some 70 ft. beneath, making a hole upwards of 16 ft. deep. All the trees and shrubs in the vicinity of the water tower were washed up, some of them being carried away, together with about 60 yards of the fence down the Fountain Road, as far as the Sydenham Hill Station, a distance of three-quarters of a mile. That portion of the grounds surrounding the tanks was speedily a scene of confusion; but the damage was not confined to the Company's premises only. The water rushing across the road and into the grounds of the residents adjoining did serious damage. An examination of the portions of the tank which it was possible to get at disclosed what was most probably the cause of the disaster—viz., an amount of corrosion which had taken place in one of the diagonal bars, from which it was evident that three or four bolts had been missing for some time, causing the bar to give way under pressure until it had gradually broken through, and afterwards slipped from its position, leaving the plates of the tank unsupported, and consequently not able to resist the pressure put upon them. The damage, of course, is very considerable, but it is a matter of congratulation that no lives were lost, nor any serious personal injury sustained.

Share List of Gas and Water Companies.

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.	Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.	Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
£		GAS COMPANIES.	£ s. d	£ s. d	£		£	GAS COMPANIES.	£ s. d	£ s. d	£		£	GAS COMPANIES.	£ s. d	£ s. d	£
589944	10	Alliance and Dublin	10 0 0	10 0 0	17—17⅜	6200	5	Georgetown, Guiana	5 0 0	7 0 0	4¼—4¾	500000*l.*	Sk.	South Metropoltn.	100 0 0	11 15 0	203—208
10000	20	Anglo-Romano . .	20 0 0	10 0 0	21—23	300000	100	Glasgow Corporation Gas	100 0 0	9 0 0	205—210	1305000	Sk.	Do., "B" . . .	100 0 0	*	182—187
5000	20	Bahia (Limited). .	20 0 0	5 0 0	15—16							12000	5	Tottenham & Edmonton	5 0 0	10 0 0	9—10
1000	20	Do., 1st pref. . .	20 0 0	10 0 0	25—27	115000	100	Do., do.	100 0 0	6 15 0	155—160						
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	20—22	..	100	Grimsby Gas, A. .	100 0 0	..	186—190	2864	10	Do.	6 0 0	7 0 0	..
40000	5	Bombay (Limited).	5 0 0	7 10 0	6—6¼	..	10	Hampton Court . .	10 0 0	10 0 0	15—16	1500	10	Wandsw. & Putney	10 0 0	10 0 0	14½—15
10000	5	Do., fourth issue.	4 0 0	7 0 0	2—1 pm.	7600	10	Hong Kong (Lim.)	10 0 0	10 0 0	15—16	1500	10	Do.	10 0 0	7 10 0	12½—13½
10000	10	Bournemouth . . .	10 0 0	8 0 0	13½—14½	5000	10	Hornsey	10 0 0	10 0 0	15—16	4000	10	Do.	10 0 0	7 0 0	11½—12
229700	..	Brentford	100 0 0	9 0 0	150—155	2000000*l.*	100	Imperl. Continental	100 0 0	10p.c.& 2 p.c. bonus	188—191	26000	5	West Ham	5 0 0	10 0 0	8½—9½
..	..	Do., 5 per ct. pref.	100 0 0	5 0 0	95—100							..	10	West Kent	10 0 0	10 0 0	14—16
..	20	Do., D shares . .	18 0 0	9 0 0	6—8 pm.	..	..	Kingston	..	7	..	2400	5	Woolwich, Plmstd. and Charlton . .	5 0 0	16 0 0	9—10
5400	20	Do. Brighton	20 0 0	10 0 0	36—38	..	..	Lea Bridge	..	7 0 0	11½—12½						
5000	20	Brighton and Hove	20 0 0	10 0 0	35—37	56100*l.*	100	Liverpool United .	100 0 0	10 0 0	185—190						
14000	20	British (Limited) .	20 0 0	10 0 0	35—37	1691000*l.*	100	Do., B	100 0 0	7 0 0	125—135						
7282	20	Cagliari (Limited).	20 0 0	8 0 0	17½—18½	3865000*l.*	Sk.	London	100 0 0	10 0 0	184—187						
1500	10	Colney Hatch . . .	10 0 0	5 0 0	9—11	1500000*l.*	Sk.	Do., 1st pref. . .	100 0 0	8 0 0	125—130						
3500000*l.*	Sk.	Commercial	100 0 0	11 5 0	193—198	7622	25	Do., A shares . .	25 0 0	6 0 0	31—33						
7000000*l.*	Sk.	Do., 7 per cent. .	100 0 0	8 5 0	135—140	266924*l.*	Sk.	Do., Debenture stock	100 0 0	5*l.* & 6*l.*	..						
20000	20	Continental Union.	20 0 0	6 10 0	20½—21½												
20000	20	Do., new	14 0 0	6 10 0	par. 1pm	15000	5	Malta and Mediterranean (Limited).	5 0 0	2 10 0	2¼—2⅝						
10000	20	Do., preference .	20 0 0	7 0 0	24½—25½												
750000*l.*	Sk.	Crystal Palace District	100 0 0	10 0 0	172—177	6000	5	Do., preference .	5 0 0	7 10 0	5—5⅛						
1250000*l.*	Sk.	Do., 7 per cent. .	100 0 0	7 0 0	125—130	20000	5	Mauritius (Limited)	2 5 0	1 0 0	1⅝—1¾ dis						
500000*l.*	Sk.	Do., preference .	100 0 0	6 0 0	118—122	8000	20	Monte Video (Lim.)	20 0 0	6 0 0	16—17	615600	100	Chelsea	100 0 0	6 10 0	187—192
25000	6	Do., ordin. 7 p. c.	1 4 0	7 0 0	¾—1 pm.	10	10	Nictheroy, Brazil (Limited)	10 0 0	5 0 0	6—6½	1624700	100	East London . . .	100 0 0	6 10 0	197—202
7100	25	Edinburgh	25 0 0	10 0 0	46—48	30000	5	Oriental (Calcutta).	5 0 0	9 0 0	7—7½	10798	50	Grand Junction .	50 0 0	5 0 0	103—108
23406	10	European (Limited)	10 0 0	10 10 0	19½—20½	30000	5	Do., new shares .	4 0 0	9 0 0	1¼—1¾ pm	5840	25	Do., ½ shares . .	25 0 0	5 0 0	52—55
12000	10	Do., new shares.	7 10 0	10 10 0	6½—7¼	10000	5	Ottoman (Limited).	5 0 0	3 0 0	2¼—2⅝	6160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	5 0 0	40—45
35406	10	Do., new shares .	5 0 0	10 10 0	4—5 pm.	10000	10	Parà (Limited) . .	10 0 0	5 0 0	6—6½	5551801.	100	Kent	100 0 0	8 0 0	280—290
4096300*l.*	Sk.	Gaslight & Coke A.	100 0 0	11 0 0	187—189	3000	10	Richmond (Surrey)	10 0 0	10 0 0	17—17½	781800*l.*	100	Lambeth	100 0 0	6 10 0	187—192
1000000*l.*	Sk.	Do. B.	100 0 0	4 0 0	75—78	3000	10	Do., new	10 0 0	9 0 0	..	3261500*l.*	100	Do., max., 7½ p.c.	100 0 0	6 10 0	160—170
50000	10	Do. do., 5th do. .	10 0 0	5 0 0	17—17½	37500	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	23—25	442	100	New River	100 0 0	10 3 8	375—385
2000000*l.*	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	217—222							4475	100	Do.	85 0 0	10 3 8	290—300
3000000*l.*	,,	Do. D do. do.	100 0 0	10 0 0	217—222	1500	32½	Shanghai	32 10 0	12 0 0	..	400000	100	Do., deb. sk., 4p.c.	100 0 0	4 0 0	101—103
1650000*l.*	,,	Do. E do. do.	100 0 0	10 0 0	217—222	135000	100	Sheffield, A	100 0 0	10 0 0	197 198	6668000*l.*	100	Southwrk & Vauxh.	100 0 0	6 0 0	190—200
300000*l.*	,,	Do. F 5 do. do. .	100 0 0	5 0 0	108—111	99700	100	Do., C	100 0 0	10 0 0	195—197	3247000*l.*	100	Do., pref. stock .	100 0 0	5 0 0	126—129
600000*l.*	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	160—165	12500	5	Singapore (Lim.) .	5 0 0	7 10 0	6—6¼	1265000*l.*	100	Do., D shares. .	100 0 0	6 0 0	165—170
1300000*l.*	,,	Do. H	100 0 0	7 0 0	134—137	2000	5	Do., preference .	5 0 0	7 10 0	5¾—6¼	15073	61	West Middlesex .	61 0 0	6*l.* p.sh.	163—168

* Surrey capital, 11 per cent. Phœnix capital, 10½ per cent.

WATER COMPANIES.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

3865.—Weston, F., Brixton, London, "Improvements in apparatus connected with increasing the illuminating power of coal gas." Sept. 24, 1880.
3869.—Purssell, J. R., Merton, Surrey, "Improvements in the construction, arrangement, and method of action of gas-engines." Sept. 24, 1880.
3914.—Brierley, W., Halifax, Yorks, "Improvements in extracting or recovering prussiate of potash, ammonia, tar, and gas from nitrogenous substances." A communication. Sept. 27, 1880.
3919.—M'Donald, J., Queen Victoria Street, London, "Improved means of and apparatus for increasing the illuminating power of gases." Sept. 28, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1476.—Jensen, P., Chancery Lane, London, "Improvements in the production of light and heat, and in apparatus for the same." A communication. April 10, 1880.
1545.—Sugg, W. T., Westminster, "Improvements in gas-burners and lanterns." April 15, 1880.
1854.—Sugg, W. T., Westminster, "Improvements in gas-regulators." May 6, 1880.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3333.—Symons, W. T., "A fender gas-stove." Sept. 1, 1877.
3397.—Dennett, J. C., "An improved water-meter and water power motor valve motion and regulator." Sept. 6, 1877.
3445.—Evans, F. J., and Sugg, W. T., "Improvements in the manufacture of coal gas and in the treatment of ammoniacal liquor obtained in such manufacture." Sept. 12, 1877.

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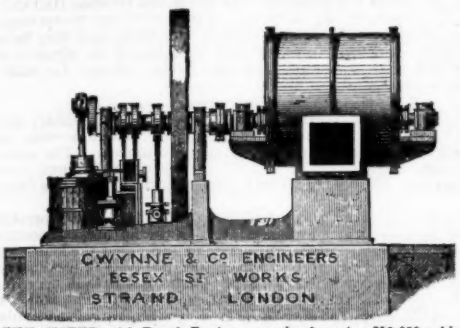

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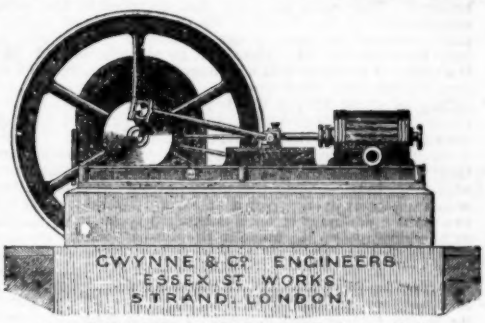

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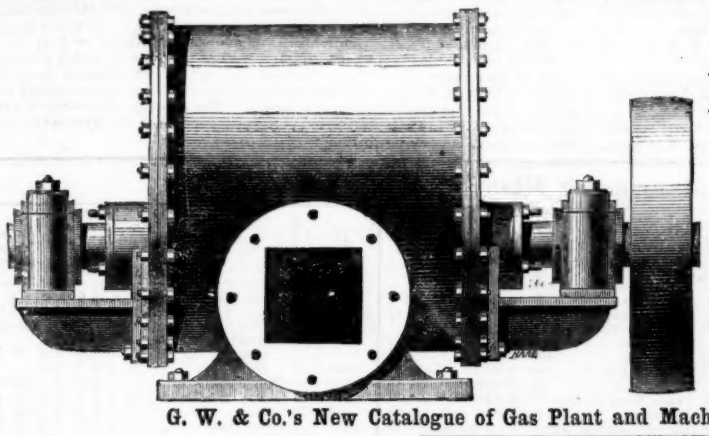

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HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c.
Copies, by post, Threepence, direct from the Author, Magnus Ohren, Assoc.M.I.C.E., Gas-Works, Sydenham.

ADVERTISER, aged 36, is open to a Re-engagement as WORKING MANAGER or FOREMAN. Can Set Retorts, Lay Mains and Services, Fix and Repair Meters. Six years in last situation. Good testimonials.
Address James Surl, 18, Dorchester Place, Blandford Square, London, N.W.

WANTED.—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references.
Address No. 678, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS-FITTER wanted, one used to Main and Service Laying; also to do rough Smith's work preferred. Wages 21s. Also a Strong Youth to Light and Put Out Lamps, and to Assist in Retort-House.
Apply to the Manager, Gas-Works, Godalming.

GAS MANAGER WANTED.

THE Gas Committee of the Heywood Local Board invite APPLICATIONS from competent persons for the office of GAS MANAGER, at their Works, Hooley Bridge, Heywood.
The production of gas at these works is 60 million cubic feet per annum.
The salary will be £170 per annum.
Applications, enclosing testimonials, to be endorsed "Gas Manager," must be sent to me not later than Tuesday, the 12th of October next.
Jno. Banks, Clerk to the Local Board.
Office of Local Board, Heywood, Sept. 24, 1880.

WANTED, good Second-hand Purifier, about 6 ft. by 4 ft., 3 ft. deep, 8 in. lute.
Address Fydu Iron and Tin Plate Company, Newport, Monmouth.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; One Station Meter to pass 8000 feet per hour (makers West and Gregson); also nine D-shaped clay retorts, 16 in. by 14 in. by 8 feet.
The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused.
Further particulars on application to Mr. Longworth, Gas Offices, Guildford.

AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Dronfield Gas- light and Coke Company invite TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at their Works from Nov. 1, 1880, to Dec. 31, 1881.
Tenders, stating price per ton at the Works, or delivered in casks at Dronfield Railway Station, to be sent to me not later than the 31st inst.
The Directors do not bind themselves to accept the highest or any tender.
Christopher Thorpe, Secretary.
Chesterfield, Oct. 2, 1880.

FOR SALE.—In consequence of the decease of Mr. Milne, a GAS-WORKS in a small Manufacturing Town in Ulster. Present make 1½ millions, which might be increased.

For particulars apply to ALEXR. MILNE AND CO., Gas-Works Lessees and Engineers, 11, Chichester Street, BELFAST.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

DORKING GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for their Surplus TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for a period of One year, from Oct. 1, 1880, to Oct. 1, 1881.

Coals carbonized about 1500 tons; the same can be delivered in the Contractor's casks if required, at either of the Dorking Railway Stations.

Tenders to be sent in not later than the 25th of October next, endorsed "Tender for Tar, &c."

The Directors do not bind themselves to accept the highest or any tender.

Any further information can be obtained by application to

WALTER PHILPS, Manager.

Gas Company's Office, Station Road,
Dorking, Oct. 1, 1880.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ⅛ brass to a 2-in. Socket.

May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

TO IRONFOUNDERS.

THE Water-Works Committee of the Heywood Local Board invite TENDERS for the Supply of 2200 Yards of 6-in., and 2200 Yards of 4-in., Turned and Bored CAST-IRON PIPES.

Specifications may be seen and further information obtained on application to Mr. James Diggle, Water-Works Manager, Miller Street, Heywood.

Sealed tenders, endorsed "Iron Pipes," to be addressed to the Chairman of the Water Committee, and sent to me not later than Saturday, the 16th of October next.

The Committee do not bind themselves to accept the lowest or any tender.

JNO. BANKS, Clerk to the Local Board.

Office of Local Board, Heywood, Sept. 28, 1880.

SOUTHPORT CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the Surplus TAR produced at the Gas-Works for a period of One or Two years from the 18th of November next.

Further particulars may be obtained on application to Mr. Booth, Gas Manager.

Tenders, endorsed "Tar," to be sent in to me not later than Wednesday, Oct. 27 next.

By order,

J. H. ELLIS, Town Clerk.

Town Hall, Southport, Sept. 25, 1880.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

MR. CORBET WOODALL, C.E.,

Has Removed his Office to

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

NOTICE OF REMOVAL.

THE OWNERS OF

THE

BIRTLEY IRON-WORKS

AND

PELAW MAIN COLLIERIES

Have REMOVED their London OFFICES from No. 101, Cannon Street, to No. 46, Cannon Street.

Their Warehouse for Gas and Water Pipes and other Castings is at Scott's Wharf, Bankside, SOUTHWARK.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

THE

THAMES BANK IRON COMPANY,

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS AND ALL KINDS OF GAS-WORKS APPARATUS,

SOCKET-PIPES FOR GAS OR WATER PURPOSES,

FLANGE-PIPES FOR STEAM,

RAIN-WATER PIPES AND GUTTERS,

HOT-WATER BOILERS, PIPES, AND CONNECTIONS,

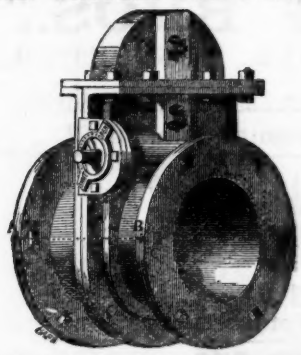
LAMP-COLUMNS, LAMPS, LAMP-FRAMES, WROUGHT TUBES, &c.,

HOT WATER AND HOT AIR APPARATUS,

Erected complete on the most Improved Principles.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.

ALSO MAKERS OF

J. BEALE'S NEW PATENT GAS EXHAUSTERS, STEAM-ENGINES for Driving Gas Exhausters,

VALVES FOR AMMONIACAL LIQUOR, TAR, &c., IMPROVED BRIDGE VALVES for Regulating the Seal in Hydraulic Mains, so arranged that when once adjusted for the proper overflow they can be closed entirely and opened again without altering the adjustment.

GAS THROTTLE-VALVES, SPECIAL GAS-VALVES with Columns, Gauges, &c.

BYE-PASS VALVES, SCREW WATER-VALVES, &c., &c.

B. DONKIN & CO., BERMONDSEY, LONDON, S.E.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM

GAS APPARATUS EXHIBITION IN GLASGOW.

PHILP'S COCKBURN HOTEL,

141, BATH STREET, GLASGOW.

This Large New Hotel is in connection with the well-known Cockburn Hotel, Edinburgh, and conducted on the same principles.

CHARGES MODERATE.

Special Terms for Parties staying a week or longer.

J. PHILP, PROPRIETOR.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

DOULTON'S LAMBETH RADIATING TILE STOVES.

No Cleaning. No Sweeping. No Smell.
No Fixing. No Attention. No Waste.
No Danger. No Dust. No Dirt.

For Studios. For Conservatories.
For Halls. For Schoolrooms.
For Surgeries. For Waiting Rooms.

BURN FOR 12 HOURS WITH 5 POUNDS OF COAL.

DOULTON & CO.,
Lambeth Pottery, London, S.E.
May be had of the principal Ironmongers.

KÖRTING'S STEAM-JET EXHAUSTER,

IMPROVED CLELAND'S PATENT.

UPWARDS OF 400 IN USE.

CLELAND'S PATENT SLOW-SPEED CONDENSER, AND CLELAND'S PATENT STEAM SCRUBBER.

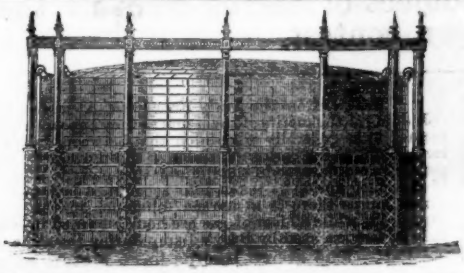
FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,

OR TO

GERALD J. TUPP, Creek Engine-Works,
Middle Mall, Hammersmith, London, W.



HENRY BALFOUR & CO.,

ENGINEERS, IRONFOUNDERS, AND GAS APPARATUS MAKERS,

39, FINSBURY CIRCUS, LONDON, E.C.

Works: DURIE FOUNDRY, LEVEN, FIFE, N.B.

MANUFACTURERS OF

GASHOLDERS, SINGLE OR TELESCOPE, WITH OR WITHOUT COUNTERBALANCE GEAR; TANKS, CAST & WROUGHT IRON.

BOILERS, CONDENSERS, CRANES, EXHAUSTERS AND ENGINES,

GIRDERS (Cast and Wrought Iron), IRON PIPES, PUMPS, PURIFIERS, RETORTS & FITTINGS,

ROOFS, SCRUBBERS, SHAFTING, VALVES, WASHERS.

ANDERSON'S PATENTED INVENTIONS, VIZ.—

FOUR-WAY BYE-PASS VALVES, ENGINES AND EXHAUSTERS, REVOLVING BRUSH SCRUBBERS, GAS-WASHERS, FUEL-MAKING MACHINES, GOVERNORS, &c.

H. B. & Co. undertake Contracts for the Supply and Erection of Gas-Works, either for Towns or Mansions, or the Remodelling of existing Works.

SHIPPING ORDERS receive special attention.

H. B. & Co. having had large experience in this Department, undertake to ship, f.o.b., properly packed and marked for export.

ESTIMATES AND DESIGNS ON APPLICATION.

S. PONTIFEX & CO.,

GAS AND WATER ENGINEERS,

22, COLEMAN STREET, LONDON, E.C.,

Supply and Erect Street Lamp Columns, together with Head Irons and Lanterns, as well as all the other fitting connected therewith.

S. P. & Co. also contract with Gas, Railway, and other Companies, Local Boards, and Vestries, for the maintenance and repair of Lamps and Fittings.

W. C. HOLMES & Co.,

ENGINEERS AND CONTRACTORS

FOR

GAS AND WATER-WORKS,

WHITESTONE IRON-WORKS,

HUDDERSFIELD.

REFERENCES TO UPWARDS OF 400 WORKS.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS,

LIMITED,

MANUFACTURERS OF

PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES,

BENDS, JUNCTIONS, &c.

Fire-Bricks, Tiles, Blocks, and Chimney-Tops.

ERECTION of CHEMICAL PLANT.

SULPHATE OF AMMONIA APPARATUS.

CONTINUOUS METHOD.

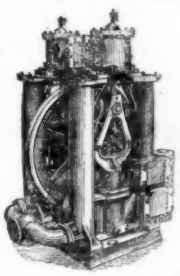
Improved "Coffey Still" Process and other Methods.

Apparatus for Making Gray or White Sulphate of Ammonia from Nitrogenous Bodies.

Models of above plant supplied, price £3 10s. and £6 10s., or plans at moderate rates. Assistance given to persons making experiments.

JOHN G. HARVEY, 84, COBOURG STREET, LEEDS.

John Cameron's Specialities



ARE HIS

PATENT LEVER

PUNCHING MACHINES

AND HIS

STEAM-PUMPS

FOR

GAS-WORKS,

Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

WORKS:

OLDFIELD ROAD, SALFORD, MANCHESTER.

H. & C. DAVIS & CO.'S

Illustrated Catalogue sent Free.

FAMILY GAS KITCHENERS,
HOTEL GAS RANGES,
ARTIZANS & COTTAGE GAS COOKERS,
BREAKFAST GRILLERS, &c.
GAS BATHS,
CIRCULATING GAS BOILERS,
ASBESTOS FIRES, AND CHEERFUL HEATING STOVES.

286, 288, & 290, CAMBERWELL ROAD,
LONDON, S.E.

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the **FLAT-FLAME BURNER** into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80*-candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot*) *by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80*-candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Meeting at Perth, July, 1880.

In his Inaugural Address the President (Mr. Robb) spoke of knowing, from his personal experience, "what it is to face an inspection of Wet Meters, with all its disagreeable concomitants;" and, referring to the use of Dry Meters by some Corporations and Gas Companies, he expressed the hope that "the encouragement thus given to manufacturers will stimulate them to improve and perfect the Dry Meter." From this it would appear that to improve and perfect the Dry Meter is, according to Mr. Robb, a work still requiring to be done—an opinion it is not in our power to refute.

The "disagreeable concomitants" experienced by those who have to "face an inspection of Wet Meters" arise solely from the "watering," for in all other respects "an inspection of *Wet* Meters" differs nothing from an inspection of *Dry* Meters.

When ordinary Meters are used, watering is a necessary part of every inspection, and the fact that the Meter registers more gas at a high than at a low water-level makes the operation in many cases unpopular. Hence the "disagreeable concomitants" which sometimes attend it.

Mr. Robb found "33 cubic inches of water per Meter per annum as the quantity requisite to supply a 3-light Meter for a year." This statement, being the result of his personal experience, may be accepted as correct, and justifies us in stating that the WARNER & COWAN METER need not be watered more frequently than once in twelve months at the very utmost, for the 3-light Meter may have withdrawn from it upwards of 64 cubic inches of water before the valve closes. This quantity is nearly double that stated by Mr. Robb as sufficient for a year.

The value of the unvarying accuracy of the WARNER & COWAN METER is thus greatly enhanced by the increased range of water-line thereby obtained. With regard to larger sizes the same remarks will hold good. For example, there may be withdrawn from the 100-light Meter 4 gallons of water, and from the 300-light 17 gallons, before the valve will close. When watering is necessary at the rare intervals indicated, it is regarded without suspicion by the consumer, who for the sake of his gas supply is the person most interested in the operation.

W. & B. COWAN,

(ESTABLISHED 1827.)

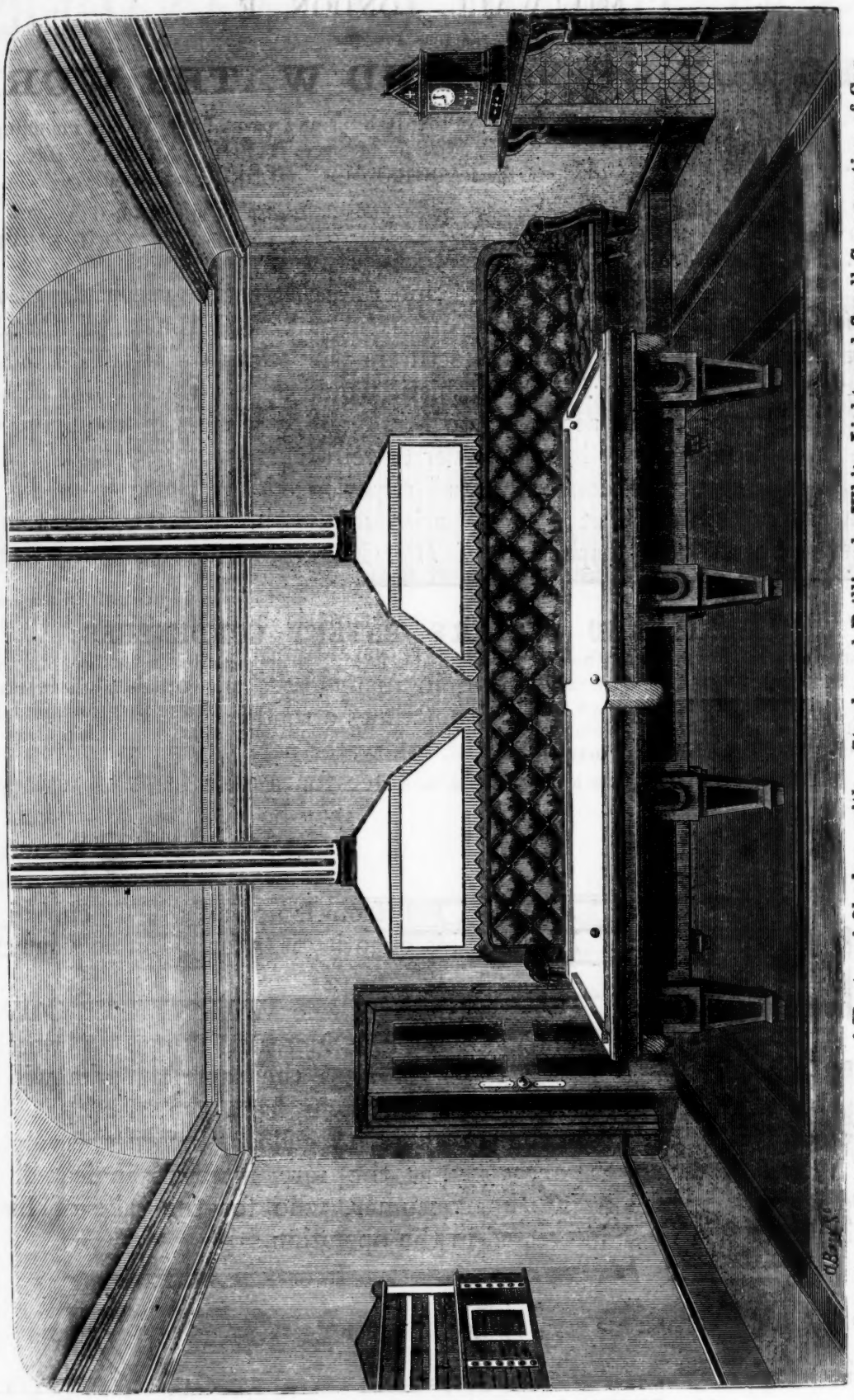
WET & DRY GAS-METER MANUFACTURERS,

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*

THE LATEST NOVELTY

FOR THE EFFECTIVE LIGHTING of BILLIARD TABLES.

BILLIARD TABLE LIGHTING BY WILLIAM SUGG'S PATENT SELF-VENTILATING SYSTEM AND BURNERS OF HIGH ILLUMINATING POWER,



Securing a Total Absence of Heat and Shadow, with a Steady and Brilliantly White Light, and Small Consumption of Gas.

N.B.—All products of combustion are carried away into the open air, and cannot, therefore, mix with and vitiate the atmosphere of the room.

One of the above has been fitted up in the Billiard-Room of the Raleigh Club, Regent Street, and the Secretary states that the Table is the best lighted he has ever seen.

APPLY TO

WILLIAM SUGG,

VINCENT WORKS, WESTMINSTER, & GRAND HOTEL BUILDINGS, CHARING CROSS.

SAMUEL CUTLER & SONS,

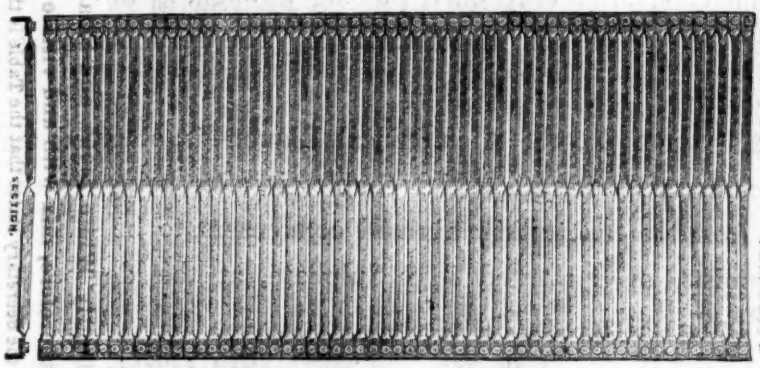
MILLWALL, LONDON, E.,

CONTRACTORS FOR THE

ERECTION OF GAS AND WATER WORKS,

Undertake their ENTIRE ERECTION or EXTENSION in any part of the World, including Small Works for VILLAGES and MANSIONS, as well as of very LARGE EXTENT. Have recently constructed for the PHŒNIX GAS COMPANY the LARGEST GASHOLDER yet erected.

S. C. and SONS supply *every* requisite for Gas-Works, and keep in stock Small Articles, such as BARROWS, SCOOPS, RETORT-LIDS, BOLTS, &c.; and they manufacture WOOD SIEVES of a very superior description.



CUTLER'S PATENT WATER-VALVES

Are the very best possible as PURIFIER VALVES; leakage impossible, most easy to work, never get out of order or the worse for wear, and can, if desired, be very simply arranged to work the whole or a part of a set of Purifiers in any conceivable order whatever. Have already been erected and approved at the London Gas-Works, Nine Elms; Phœnix Gas-Works, Greenwich; Maidstone, Ipswich, &c.

Full Particulars on Application.

CUTLER'S PATENT SIEVES

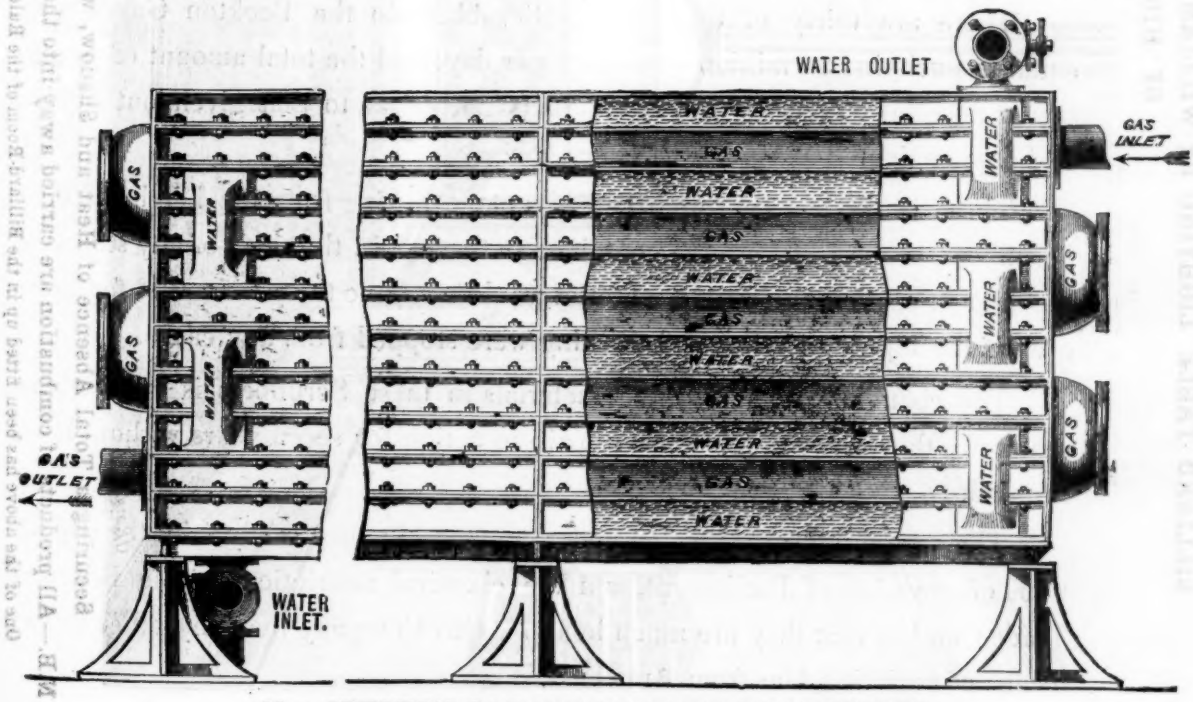
Are the most durable. The sieve bars presenting an inclined plane to the flow of the Gas, offer the least possible resistance, greatly reducing pressure, and permitting contact with every part of the purifying material. Have been supplied to many of the London and Provincial Gas-Works, and give great satisfaction.

Copies of Testimonials on Application.

MORRIS AND CUTLER'S PATENT CONDENSERS

Adopt water as a cooling medium, the respective streams flowing in opposite directions; quantity of water required but small, and being only raised in temperature, is useful for any purpose of the works. The power of Condensers can be regulated at will by the amount of water permitted to pass through. Erected and giving great satisfaction at Brentford, Tunbridge Wells, Maidstone, Buxton, Phœnix Gas-Works, Greenwich; where its advantages may be seen.

Mr. WATES, of Greenwich, has kindly offered to reply to any inquiries addressed to him as to its efficiency.



Also CUTLER'S PATENT MOUTHPIECE SUPPORTS,

AND

CUTLER'S PATENT REMOVABLE DIPS.

[*See* JOURNAL for Nov. 25, 1879.]

THE

MANN & WALKERS' PATENT SCRUBBER.

Extensive use. The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required. By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained. The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased. The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required. The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works. There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained. There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed. The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

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F. & C. OSLER,

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MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

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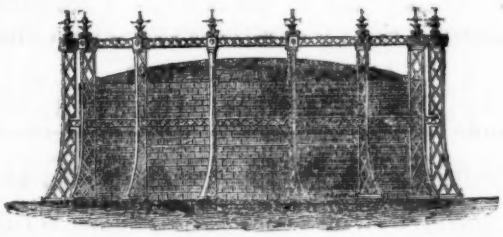
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 13,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

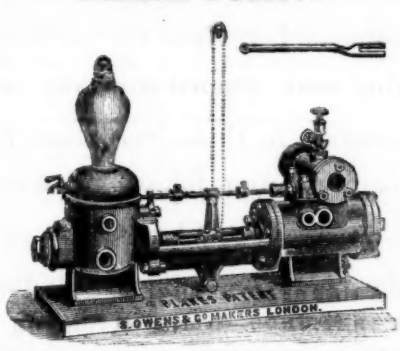
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

Upwards of 30 at The Gaslight and Coke Company's Works, Beckton.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

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IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

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CONSULTING GAS ENGINEER,

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HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

ALFRED LASS,

Fellow of the Institute of Chartered Accountants,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

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MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee,

W. W. BOX,

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RETORT BOLTS,

AND ALL KINDS OF

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SUITABLE FOR

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TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

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GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67-*candle gas, with* 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: MR. F. J. LEE SMITH, Bromley, KENT.

WOOD **TROUGHING**

For Preserving Service-Pipes.

Price from Three-Farthings per Foot, In any Lengths.

THOS. PROUD,

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STEPHEN HOBBS,

OF

CLARENCE VILLA, RAMSGATE,

CONTRACTOR FOR WELL SINKING

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SEWERING WORK GENERALLY,

Begs to inform Engineers and others that he has just completed the extensive and important excavations, amounting to 4000 cubic yards, for the Ramsgate Improvement Commissioners (under the direction of their Engineer, Mr. Valon), whereby a good and abundant supply of water has been obtained, and is now in a position to undertake further work in town or country.

References kindly permitted to be made to MR. WILLIAM A. VALON, C.E., RAMSGATE. Additional testimonials if required.

IMPORTANT to GAS COMPANIES.

MESSRS. JOHN ABBOT & CO., LIMITED,

OF SUFFOLK LANE, LONDON, AND GATESHEAD,

Manufacture and Erect

SULPHATE PLANT

On the most Modern and Improved Plan.

EXAMPLES

Can now be seen at

NEWCASTLE, CARLISLE,

And will shortly be erected at the New Gas-Works,

TUNBRIDGE WELLS.

WILLIAM MACLEOD & CO.,

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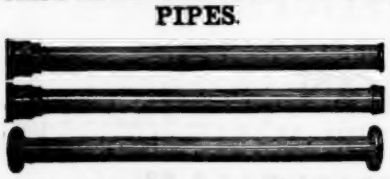
CAST-IRON GAS AND WATER PIPES.



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Prices on application.

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AGENT FOR

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NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

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Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES.

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THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

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DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

COUNTY OF DURHAM.

For Prices and Particulars, apply to

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LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

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ANTI-CORRODO TUBES

(BARFF'S RUSTLESS PROCESS)

See Professor FOSTER'S *Article on "The Corrosion of Iron" in* JOURNAL *of March* 30, 1880.

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(JAMES E. AND SAMUEL SPENCER),

Makers of ANTI-CORRODO (BARFF'S) TUBES AND FITTINGS

For Gas, Steam, and Water; also Black Galvanized and Enamelled.

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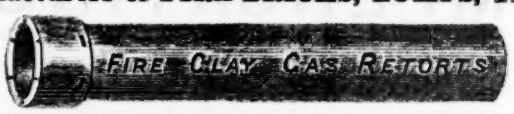
Manufacturers of FIRE-BRICKS, LUMPS, TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

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THE WIGAN COAL & IRON COMPANY,

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MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

Original Manufacturers of Dry Meters in Cast-Iron Cases.

STATION-METERS, EXPERIMENTAL-METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

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IMPROVED COMPENSATING GAS-METER.

HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

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Established 1830.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851; NEW YORK, 1853; PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

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SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

OF IMMEDIATE IMPORTANCE TO ALL GAS FACTORIES.

HARRIS & PEARSON, of Stourbridge, have an immense stock of **FIRE-CLAY GAS RETORTS,** all perfect and in good condition, and can supply orders of any magnitude, to any size or pattern, immediately on receipt of specification. Any Gas-Works disappointed by delay in the execution of Retort orders will do well to take advantage of this. Inspection invited.

HARRIS & PEARSON manufacture best Retort Bolts, Cast Iron Retort Mouthpieces, Fittings, and Lids, Cast Iron Gas and Water Pipes, and Connections of all Shapes and Sizes.

Glazed Bricks, white and in colours, Porcelain Baths, Fire-Clay Goods of all kinds, Hard Blue Paving Bricks for Retort Houses.

Prices, Drawings, and Specifications if desired.

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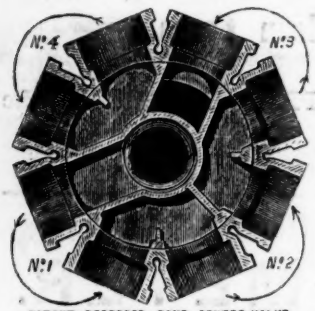
RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



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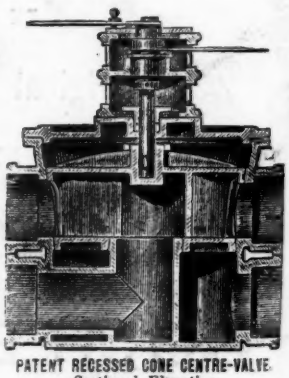
Sectional Plan.



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Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

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D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

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